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THE CONCEPT OF SOCIAL INTELLIGENCE:
AN EMPIRICAL INQUIRY

BY

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ABSTRACT

On the assumption that the ability to deal with interpersonal situations is a separate intellectual ability it was hypothesized that social intelligence is independent of abstract intelligence and practical or mechanical ability. It was further hypothesized that social intelligence consists of specific abilities which can be demonstrated by a pictorial pencil-and-paper test.

A test of social intelligence, the Social Ability Scale, was constructed and validated on a sample of 186 high school students. The K-R 20 coefficient of reliability of the test battery was .55. The factor analysis, using the Hendrikson-White method, revealed seven first-order factors six of which were described as dimensions of social intelligence. There was a very significant indication of sex differences; the female subjects scored consistently higher than the males.

The main study was conducted on a sample of 99 high school students. The variables were:

1. Three subtests of the Differential Aptitude Tests (DAT) as measures of abstract intelligence.

2. The Alexander Performance Scale (APS) as measures of practical ability.

3. Six subtests of the Social Ability Scale (SAS) chosen after the validation study as measures of social intelligence.

4. The grade point average (GPA) as a measure of scholastic achievement.

Four factors were revealed. There were no separate factors to describe abstract and practical intelligence - all the DAT and APS variables loaded on Factor I. The various SAS variables had significant saturations on the other three factors. Two DAT subtests, Verbal Reasoning and Abstract Reasoning, were the best predictors of scholastic achievement.

The results of the research indicate the following conclusions:

1. Social intelligence is an independent ability. It has a significant relationship with abstract intelligence but none with practical or mechanical intelligence.

2. Social intelligence consists of independent specific abilities.

3. The specific abilities of social intelligence can be demonstrated by means of printed tests using still photographs.

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INTRODUCTION

In the area of intelligence, psychologists have long been preoccupied with studies on how a person deals with objects - abstract or concrete. Researches have been carried out to study the various abilities a person employs in manipulating objects. Countless tests have been constructed to demonstrate the operation of various intellectual abilities. Educators have been quick to adopt and apply the results of these studies; they not only use the tests in schools but also strive to have the children develop the abilities. A child is taught and learns to count, to remember concepts and names of objects, to discriminate, to solve problems, etc. at school as well as in the home.

Physical objects do constitute a person's external environment but not the whole of it. We must include _people_. It can be safely said that, in general, _people_ have deeper and more lasting effects on an individual than do objects. Then we can ask these questions: (1) Is there an intellectual ability or abilities involved in person-to-person relationship situations?; (2) If there is, how is this "social" ability related to other abilities? One might assume that abilities used in manipulating objects are no

different from those used in dealing with people. Equally acceptable is the assumption that the set of abilities used in dealing with objects are different from those used with people.

Random observations may support both assumptions given above. There are people who can work out calculus problems or assemble appliances from spare parts with equal expertise. On the other hand, there are skilled technicians who are the worst teachers or most incompetent administrators. Some people are at their best only when dealing directly with people. They consider working with machinery or in the laboratory a very dull, unchallenging task. For others the vice-versa is true.

What actually is the true state of affairs? This study hopes to give some answers to this question. Chapter I presents the problem to be covered by this thesis. It also discusses the theoretical framework, and states the null hypotheses in relation to social intelligence.

An overview of social intelligence is given in Chapter II. A general discussion of the process and the need for social interaction is given. The various theories

regarding social ability are also presented.

Chapter III gives a review of studies and researches done in the area of social intelligence.

One of the main objectives of this study was the construction of a social ability scale. Chapter IV describes the steps followed to construct a purely pictorial, nonverbal test of social ability - from the compilation of pictures expressing various feelings, moods, emotions, etc., to the evaluation of these photographs and finally to the construction and description of the individual tests in the battery.

The pilot study, which is actually a validation study of the social ability scale is described in Chapter V. The results of the main study, wherein social ability was studied in conjunction with abstract ability and practical ability, are given in Chapter VI.

The last chapter states the conclusion and discusses the implications of the present study.

CHAPTER I

THE PROBLEM

Purpose of the Study

It has been proposed (Thorndike, 1920; Spearman, 1927; Guilford, 1967) that different types of intelligence are employed in various situations and problems. Thorndike, who suggested abstract, mechanical, and social types of intelligence, expressed this view (1920, p. 229):

> Between one another of the three there is great disparity. The best mechanic in a factory may fail as foreman for lack of social intelligence. The whole world may revere the abstract intelligence of a philosopher whose mechanical intelligence it would not employ at three dollars a day.

Abstract and mechanical types of intelligence have been studied quite extensively. The oft repeated reason for the neglect of social intelligence is the difficulty of constructing reliable and valid test instruments.

The four studies done on social intelligence (Moss, et al, 1930; Wedeck, 1947; O'Sullivan, 1965; Hendricks,

1969) showed some of the tentative generalizations summarized below:

1. On the existence of social intelligence.

   a. There are specific abilities that a person uses in interpersonal relationships.

   b. These specific abilities are independent of the abilities a person uses in situations involving non-human materials.

   c. Social intelligence, although an independent variable, is related to other intellectual variables.

2. On the measurement of social intelligence.

   a. Social intelligence involves verbal and nonverbal cues. Verbal cues consist of written and spoken language while nonverbal cues are such things as facial expressions, bodily gestures, postures and body movements.

   b. It is possible to measure social intelligence using nonverbal and pictorial test instruments.

These generalizations serve as the research hypotheses of this thesis.

The following are the objectives of the study:

1. To explore in depth the above generalizations about the

nature of social intelligence.

a. To acquire a deeper understanding of the specific abilities involved in interpersonal relationships.

b. To determine how social intelligence is related to other types of intelligence, viz., abstract and mechanical or practical.

c. To discover the extent and nature of possible sex differences in social intelligence.

2. To formulate nonverbal tests of social intelligence employing still photographs.

3. To establish the relationship between social ability and scholastic achievement.

Theoretical Framework

This writer defines social intelligence, in the present study, as the person's ability to deal and cope with situations arising from any social or personal interaction; it involves not only responding to other people's behavior but also to ones' own behavior. It encompasses all types of human relationships with no regard to the time and mode of occurrence as well as the people involved. The definition is broad and may be criticized as indefinite and vague. It is intended to be broad because social intelligence has for its

subject matter the whole spectrum of human behavior. Furthermore, a behavioral information does not have the unchanging characteristic which an information derived from objects has; a mathematical problem can be repeated time after time and still retains its original implication or a right triangle remains a right triangle whether it is used in geometry or calculus. Such is not the case with behavioral stimulus or response; what appears to be the same form of behavior can vary with every person, time and situation. Take for instance the most common and simplest form of human response - smile. A smile can be a nervous smile, an annoyed smile, an embarrassed smile or just plain, pleasant smile depending on the situation and circumstance surrounding or leading to the response.

Social intelligence is a type of intelligence which is "social" because it operates cognitively on information derived from the behavior of other people. This writer assumes that the ability to process behavioral information is different from the intellectual ability involved in processing nonhuman material or abstract and concrete objects. A person, therefore, processes behavioral stimuli parallel to the way objects are dealt with. Hence, a person stores into or retrieves from his memory bank names, faces,

affective expressions, etc. as he stores or retrieves a piece of poetry, a mathematical formula, word meanings, etc. But the assumption is that the memory ability used in retrieving or storing a certain affective response is not exactly the same memory ability used in retrieving or storing word meanings. Social intelligence, therefore, is a cognitive approach to situations and problems arising from human relations.

In responding to other people's as well as ones' own behavior, specific abilities are used which are different from but parallel to other intellectual abilities. These specific abilities are used to deal with feelings, emotions, thoughts, moods, attitudes, perceptions and other forms of behavior which are expressed verbally through spoken and written language or nonverbally through facial expressions, body gestures, and movements. However, the measuring instrument of social intelligence used in this study is restricted to the nonverbal aspect of human behavior; the main reason for the restriction is merely convenience.

The study of the nature of social intelligence entails an explanation on its relationship with other intellectual variables. Thorndike (1920), Spearman (1927)

and Guilford (1967) proposed different classifications of intellectual abilities which include the social type. To avoid the narrowness of Spearman's theory and the multiplicity of factors in Guilford's model, the present study adopts Thorndike's classification which consists of abstract intelligence, mechanical intelligence and social intelligence. Abstract intelligence refers to the abilities used in manipulating thoughts, ideas, concepts and principles in mathematics, philosophy and other disciplines. Mechanical intelligence or practical ability is employed to deal with social and personal situations.

The above discussion leads us to the question: Can one measure social intelligence? Several valid and reliable tests have been constructed to measure abstract intelligence and practical ability. Therefore, if social intelligence really exists, one can assume that a reliable and valid instrument can be constructed to measure it. The difficulty of constructing tests of social intelligence was expressed by Thorndike (1920, p. 231):

> Convenient tests of social intelligence are hard to devise.... It is doubtful, however, whether pictures can be safely used in place of realities. And for most of the activities of intelligence in response to the behavior of human beings, a genuine situation with real persons is essential....it

> eludes the formal standardized conditions of testing laboratory. It requires human beings to respond to, time to adapt its responses, and face, voice, gestures, and mien as tools.

This writer agrees with Thorndike's appraisal of the difficulty of devising a measuring instrument but disagrees with what he, in effect, is stating: that it is impossible to test social intelligence.

Artificiality is always present in any testing situation and there is no doubt that it is magnified tenfold in the testing of social ability. The measurement problem is appreciated when one considers the complexity involved in fitting into two- or three-dimensional frames (as is the case with pencil-and-paper tests) problems which are highly dependent on their <u>when</u> and <u>how</u> components. Problems arising from person-to-person relationships are highly situational and a great deal of spontaneity is involved. But it is this writer's view that the abilities used to deal with interpersonal relationships transcend the specificity of the situation; that the underlying abilities are constant, i.e., the same abilities are called upon to handle varying specific situations. Therefore, regardless of the limitations, one can still obtain a reasonably accurate

indication of a person's ability to behave in social or personal situations.

CHAPTER II

AN OVERVIEW OF SOCIAL INTELLIGENCE

The Process of Social Interaction

Stimuli generated from a person's social environment confront him almost endlessly; ceasing temporarily when he is either asleep or unconscious. There are only few instances when it appears that a person's interaction with other people is cut off. For example, an individual may willfully remove himself from active participation in society and become a recluse, but this does not completely free him from chance meetings with people. A mentally sick person may withdraw and live in a world all his own. Nevertheless, sometimes the person's mind reverts to normal and he becomes temporarily aware of the real things and real people around him. Complete lack of social interaction is, therefore, almost impossible.

Definition of social interaction. In a narrow context, social interaction may mean nothing more than an encounter of two or more people in a social setting, e.g.,

at a cocktail party, a formal dinner, at a dance, a casual meeting, etc. The concept is delimited to the occasion when the encounter occurred. A broad view, however, encompasses all types of human encounters - the time, the place, and the occasion being irrelevant. Social interaction occurs when two or more individuals meet; one person responding to another either verbally or nonverbally, physically or mentally, objectively or subjectively. The broad definition would include the whole spectrum of personal-social contacts: counselor-client, doctor-patient, priest-penitent, employer-employee, parent-child, husband-wife, friends, strangers, etc. Social interaction can happen in any conceivable place as long as there is more than one person: in a school, subway, clinic, church, hospital, etc. This study accepts the broad definition.

The encounter between two or more individuals is dynamic. It is a continuous, ongoing two-way process of stimulus-response, one person stimulating or responding to the other and vice-versa. It stops when one person removes himself from the other person's field of awareness. Since the process is an ever-changing one, even between the same pair or group of individuals, a person is continually producing or attempting to produce appropriate response(s)

to the constantly changing stimuli provided by the other person. A socially intelligent type of behavior consists of correct or appropriate response to a particular person as stimulus object. The stimulus and response behavior may be verbal or nonverbal - a smile to a friend who says hello, a reassuring hug from the mother of a frightened child.

The need for social relationship. A person's ability to deal with social or personal situations is frequently called upon in the course of his daily activities. It is a much easier task to be with people than to avoid them. Countless motives can be given for social contact which can be summarized under three possible main reasons. First, man is essentially a social being. He has the innate inclination to be with people. James (1890) wrote that:

> As a gregarious animal man is excited both by the absence and by the presence of his kind. To be alone is one of the greatest evils for him. Solitary confinement is by many regarded as a mode of torture too cruel and unnatural for civilized countries to adopt. To one long pent up on a desert island, the sight of a human footprint or a human form in the distance would be the most tumultuously exciting experience.

McDougall (1921, p. 87) explained how the social instinct is further reinforced:

> The instinct is commonly strongly confirmed

> by habit; the individual is born into a society of some sort and grows up in it, and the being with others and doing as they do becomes a habit deeply rooted in the instinct.

Bain (1899) considered "hereditary impressions of personality in the members of the species" the basis of all social instincts. Smiling, perhaps the commonest non-verbal social expression, was described by Buhler (1935) as an "original and primary reaction to the human voice and look." A study by Dennis (1938) showed that the development of some social behavior in infants follows a natural, sequential pattern devoid of any human interference of influence. The experiment was done on a pair of twins placed under "minimum social stimulation" - no adult smiled at, fondled or cuddled the babies until their seventh month. It was shown that at the stage when babies normally begin to smile the twins smiled; at the period when babies begin to laugh they started to laugh. It was shown that a person, even at an early age and with little stimulation from other people, has the potential for "people" responsiveness. But regardless of whether man's social inclination is an instinct or innate tendency, or a habit, his capacity or ability to cope with other people's behavior is not part of the instinct or habit.

The second reason is phenomenological - the development of self-awareness. "Psychological existentialists hold the view that self-awareness, consciousness of one's very existence, cannot exist in the absence of social stimulation" (O'Sullivan, 1965). From the child's awareness of other people grows the curiosity about oneself. In his awareness of you-he-she-they he becomes conscious of I-me-myself. This idea is explained by Luijpen and Koren (1969, p. 145):

> . . .The presence of others in my existence implies that my being-man is a being-through-others. If mentally I remove from my being-man the being-through-others, I would come to the conclusion that I am removing the reality of my manhood itself. Being-through-others, then, is an essential characteristic of man.

At the very early stage of a person's life social interaction provides the means of satisfying his physiological needs. Later, it becomes the instrument through which he develops his self-identity. This self-identity becomes dependent, all through his life, on his relationship with other people. He needs other people to differentiate himself from them.

The third reason is of a more practical nature, although it can be related to the first two. An adult

interacts with people, or causes social interaction to happen, to carry out his everyday job, to earn a living. A salesman has to make contact with other people to sell his products; a doctor with his patient; a teacher with his students. Success in jobs necessitating personal contact depends primarily on how well the person conducts himself in the situation.

Theories Regarding Social Ability

McDougall's innate tendencies. Innate tendencies, lacking the specific, physiological-satisfaction aim of instincts, were classified separately by McDougall (1921). Suggestion, imitation and sympathy were considered as the three most important and closely related of the pseudo-instincts. The close relationship is due to the similarity of the situation when these tendencies occur, which is directly social (1921, p. 196):

> They are closely allied as regards their effects, for in each case the process in which the tendency manifests itself invalues an interaction between at least two individuals, one of whom is the agent, while the other person is the person acted upon or the patient; and in each case the result of the process is some degree of assimilation of actions and mental state of the patient to those of

> the agent. They are three forms of mental interaction of fundamental importance for all social life, both men and animals.

The difference between the three lies in the aspect of mental activity each represents - primitive sympathy is more affective, suggestion is more cognitive, and imitation is more conative.

Spearman's psychological ability. The ability to educe relations and correlates goes beyond the abstract or ideal and the physical. It includes the psychical or psychological which Spearman (1927, p. 179) explained:

> This arises from the dual constitution of mental processes in that these imply, on one hand a "subject" that knows, strives, or feels, and on the other an "object" that is known, is striven for, or evokes feeling.

A person's apprehension of other people takes place within his own inner experience and "proceeds to generate thoughts--and even percepts--of other persons around him" (p. 180). The extension from apprehension to conception becomes the basis of the person's ability to educe relations and correlates involving people. The psychological ability, like spatial, abstract, and temporal abilities, has a high correlation with the *g* factor. Wedeck (1947, p. 133) defined psychological ability as "the ability to judge correctly the

feelings, moods, motivations of individuals."

Thorndike's social intelligence. Thorndike was probably the first to use the term "social intelligence" although he never did elaborate on the nature of this type of intelligence. Thus, he wrote in 1920:

> For ordinary practical purposes, however, it suffices to examine three "intelligences" which we may call mechanical intelligence, social intelligence and abstract intelligence. By mechanical intelligence is meant the ability to learn to understand and manage things and mechanisms.... By social intelligence is meant the ability to understand and manage men and women, boys and girls - to act wisely in human relations. By abstract intelligence is meant the ability to understand and manage ideas and symbols....

Every person is endowed with these three types of intelligence according to Thorndike, differing only in quality.

Piaget's socialized intelligence. Piaget does not refer to social intelligence or social ability per se, but to the process, or a stage of a process, whereby true intelligence functions to differentiate people from objects, and the "I" from "others". True intelligence begins to develop at about the fourth stage of the sensori-motor period - approximately after the sixth month. The child

develops, from the limited reflex schemata he was born with, a simple but true intelligence, i.e. from a reaction for the sheer pleasure of discovery to a goal-oriented behavior. Even at this period the child, who has been constantly subjected to social influences since birth, is still incapable of differentiating the social from the physical aspects of his environment. Piaget described the child's reaction to other people (1960, p. 158):

> The infant reacts to them in the same way as to objects, namely with gestures that happen to cause them to continue interesting actions and with various tries, but there is still as yet no interchange of thought; nor, consequently, is there any profound modification of the intellectual structure by the social life surrounding him.

The child would smile, make gurgling sounds, etc. to anything or anyone.

With the appearance of language, the child is exposed to new social relations which affect his thought and vice-versa. During the pre-operational and intuitive periods, the child's thoughts and language are egocentric. His thoughts and language center around himself; he is still incapable of pulling out the "I" from the "others". The child is aware of other people, of their recognition and approval, but the disequilibrium between assimilation and

directed accommodation causes him to direct his thoughts and language inwards. He talks to himself, repeats and imitates other people's words and gestures. He neither cares nor is interested in what others say or do; he seems to expect no answer to his questions. Egocentric speech and autistic thought serve two purposes: first, to give the child pleasure and satisfaction; and second, to prepare him to "decentralize" himself, i.e., to direct his thoughts and actions to people around him.

During the concrete period, the child starts to regard his environment without any distortion. His thoughts are "being socialized and guided by increasing adaptation of individuals one to another" (Piaget, 1969, p. 64). He finds that he can persuade, or reason out, or bully, other people to agree with him, or to ingratiate himself to gain favors and tokens. He realizes a vast world of people and objects that he can manipulate through communication. His thoughts become diffuse and socially-oriented. In other words, he has pulled the "I" from the mass of "others", and can look at the mass objectively from his own vantage point.

The process of socialization of intelligence reaches its peak and completion during the formal operation period. The adolescent thinks and acts without any tangible or concrete basis for behavior. He is now adept at social adaptations, at interchange of thoughts and at cooperation.

Piaget's theory of socialized intelligence is in no sense synonymous with social ability or intelligence. But one can use the process involved in the socialization of intelligence as a basis for looking into the development of social intelligence.

Piaget's theory may be contrasted to that of Vygotsky's. From the Piagetian view, the child's speech is autistic before becoming socialized. Egocentric speech is transitional; it bridges autistic and socialized speeches. Vygotsky, however, proposes that the child's speech at the outset is social before branching into egocentric and communicative speeches. Egocentric speech does not atrophy (as proposed by Piaget) but rather goes "underground" and becomes inner speech. Vygotsky found in his experiments that the number of egocentric speech increased when the child encountered a problem which hindered the smooth run of the child's activity. The child would talk loudly about the

problem to nobody in particular. Vygotsky interpreted this as a stage in the child's process of becoming aware. The similarity between the egocentric speech of a child and the inner speech of an adult is given by Vygotsky (1962, p. 18):

> The inner speech of the adult represents his "thinking for himself" rather than social adaptation; i.e., it has the same function that egocentric speech has in the child. It also has the same structural characteristic: Out of context, it would be incomprehensible to others because it omits to "mention" what is obvious to the "speaker."

An adult, when he encounters a problem, stops his activity; he does not talk loud (although some adults do) but silently reflects upon the problem.

With regards to thought development, the difference between the theories is deducible from the above discussion. To Piaget, thought develops from being autistic, then egocentric and finally becomes realistic or directed. Vygotsky's proposed developmental pattern is exactly the opposite - from realistic, to egocentric then to autistic thought. Vygotsky explained his view on the stages of thought development (1962, p. 22):

> Autistic thought - the original opposite of realistic thought in Piaget's scheme - is, in our opinion, a late development, a result of realistic thought and of its corollary, thinking in concepts, which leads to a degree of autonomy from reality and

> thus permits satisfaction in fantasy of the needs frustrated in life.

Autistic thought and realistic thought, whether from Piaget's or Vygotsky's theory fulfill almost the same function; the main difference lies in _why_. According to Piaget, the child is still incapable of grasping reality; it is still beyond the child's mind to direct his thought to reality. In Vygotsky's scheme, autistic or egocentric thought is a stage in the development of rational adult thinking. It is an attempt to deal with reality at the level of thought the child has achieved.

Guilford's behavioral content. Guilford's structure-of-intellect model (SI) is a three-dimensional representation of man's intellectual nature. The three dimensions are (1) content, (2) operation, and (3) product - representing the type of material or information to be acted upon, the process by which the material is acted upon and the result of the process, respectively. Content can either be figural (spatial), symbolic (numbers and letters), semantic (meaningful words) or behavioral. Behavioral content includes "feelings, motives, thoughts, intentions, attitudes, or other psychological dispositions which might affect an individual's social behavior" (O'Sullivan, 1965,

p. 4). Guilford provides a distinct place for behavioral content, hypothesizing that operations and products involving behavior of other people are independent of, although parallel to those involving things, numbers, or words, i.e., non-human materials. Figure 1 and 2 show the representation of the SI model and the behavioral matrix, respectively

There are thirty different social intelligence factors in the SI model combining various operations and products with the behavioral content. For example, cognition of behavioral unit (CBU) is different from cognition of behavioral system (CBS) or from memory of behavioral unit (MBU), etc. A <u>unit</u> of behavioral information, as the name implies, is a single state of a person's disposition which another person becomes aware of by simple cues as a smile, a smirk, a nod of the head, etc. The combination of various units by a common feeling or state of excitement is a <u>class</u> of behavioral information - a smile, a laugh, clapping hands, etc., all belong to the class expressing pleasure. When combined states or actions express some kind of relationship - happy-sad, cry-laughter, etc. - the product is a relation. The organization of units of behavioral information to form a defined structure results in a <u>system</u>

of behavioral information. Usually, a behavioral system involves more than two people, for example, two frightened children being scolded by their mother for taking some coins from her purse and the father silently supporting the mother. Transformation of behavioral information indicates a change or shift in the person's state or action - crying to laughing, scolding the child to hugging him, etc. The last type of behavioral product results when a person's state or action suggests a certain response, or information - given by another person - for example, when the teacher threatens detention if the pupil continues to talk the pupil becomes quiet.

The five different ways a person can act upon behavioral information are: cognition, memory, divergent production, convergent production and evaluation. Cognition is the awareness or comprehension of the behavior of other people, as well as of oneself, during a human interaction, i.e., the understanding of "attention, perception, thoughts, desires, feelings, moods, emotions, intentions and actions of other persons and of ourselves. . ." (Guilford, 1967). Cognized information may or may not remain in the individual but what does becomes part of his memory store. Memory is the storage of behavioral information, the form being

unaltered. The stored information may be retained on a short-term or long-term basis, but still available for recall. Memory is both retention and recall of information. A person does not only understand or remember faces, names, actions, feelings, etc. of other people, he becomes involved in interpersonal problems. Divergent production deals with coping and solving human relationship problems. The operation involves becoming aware of the problem at hand, taking stock of what is available in the memory store, and retrieving all the bits of information appropriate for the moment. Divergent production and convergent production have much in common. But while more than one possibility or answer is available in divergent production, the problem involving convergent production is so tightly structured and well-defined that one and only one answer is possible. The last operation is perhaps the most complex. Guilford defines it thus:

> Evaluation is a process of comparing a product of information with known information according to logical criteria, reaching a decision concerning criterion satisfaction.

Evaluation would involve the four above-mentioned operations. A person has to be aware and understand the information to be evaluated (cognition); he consults the memory store for some information relating to the material

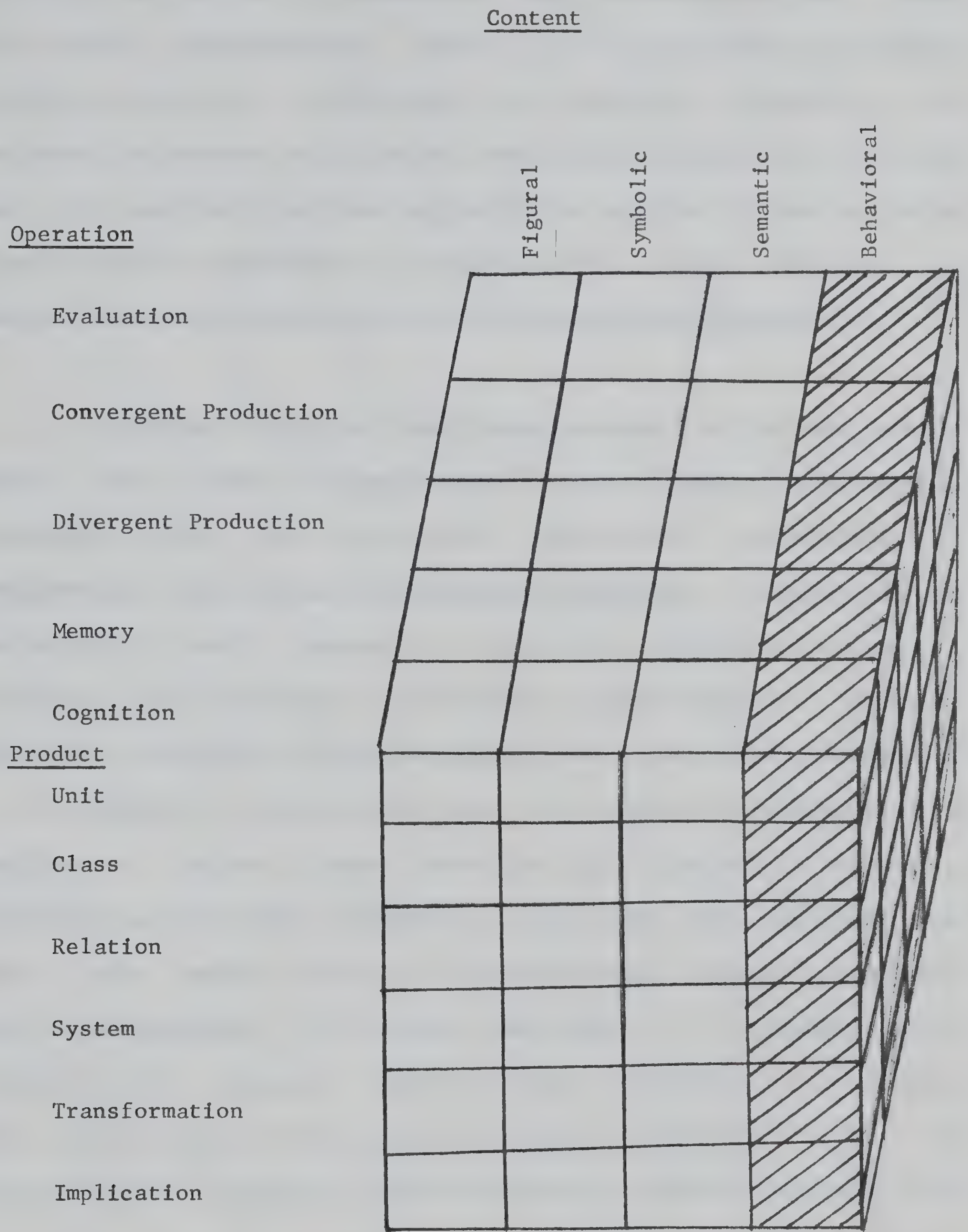
at hand (memory); considers all the possibilities directly concerned (divergent production); zeroes in on just one possibility (convergent production); and finally, compares the selected possibility with the logical criterion (evaluation).

Summary. There seems to be a consensus of authorities that there is a certain basic ability which can be called _"social intelligence"_. Social intelligence is a broad term, referring to an ability a person employs in social or human interaction situations which results in a response appropriate to the given behavioral material or information. Social interaction encompasses all types of interpersonal relationship disregarding the time and place of occurrence and the type of people involved in it.

A human being is born into a society. He has innate qualities that cannot be exercised in a social vacuum. He manifests behaviour which has been classified as appertaining to the "social instincts" (James, McDougall) or to the reflex schemata (Piaget). The development of self-identity, the awareness of I-me-myself, only happens through active interaction with other people, i.e., the understanding of other poeple leads to self-understanding.

Figure 1

Guilford's Structure-of-Intellect Model



(The shaded portion pertains to social intelligence).

Besides the psycho-physiological and phenomenological bases of human relationships there is the practical. An adult person, a priest, a scientist, or a garbage collector, has to come in contact with other people while doing his job. He has to manifest certain appropriate skills in dealing with these social relations in addition to those abstract or motor skills which belong to his professional function.

Various theories have been advanced as to how people deal with these interpersonal relationships. McDougall proposed that the person's primitive tendencies - suggestion, imitation and primitive sympathy - enable him to understand and respond to another person's thoughts, feelings and actions. Spearman's psychological ability involves eduction of psychological relations and correlates - as opposed to the abstract and the physical. Through this ability a person knows what the other person is knowing, feeling and striving. Thorndike described the ability to deal with people as social intelligence. Piaget's approach is developmental. The child develops a sensori-motor intelligence through sensori-motor assimilation involving the reflex schemata he was born with. An egocentric type of intelligence follows characterized by autistic thought and egocentric speech. An increasing awareness of his social

environment causes him to direct his thoughts and language to other people. The child develops a socialized intelligence as a social adaptation to a situation where the social pressure and his desire for control of his social environment and for cooperation becomes greater. Finally, the factor- analytic view of Guilford hypothesizes 30 independent behavioral or social factors in his structure-of-intellect model. The five operations a person can use on any behavioral information are: cognition, memory, divergent production, convergent production and evaluation. The product of any operation may be a unit, a class, a system, a relation, a transformation or an implication. A combination of behavioral content with any operation and any product is an ability a person uses in any interpersonal relationship.

CHAPTER III

REVIEW OF LITERATURE

A social intelligence test was published by Moss, Hunt, Omwake and Woodward in 1930. The test is made up of five subtests: (1) Ability to Remember Names and Faces; (2) Social Information; (3) Judgment in Social Situations; (4) Mental State of a Person from his Words; and (5) Observation of Human Behavior. All the test items, except the first, are verbal.

The test-retest reliability was .89 while self-correlation was .87. The validity, however, did not fare so well. Cleeton (1949), Taylor (1949) and Thorndike (1940) questioned the test's validity because of low subtest intercorrelations but quite high correlation with measures of abstract intelligence. But the test did differentiate groups. The median scores for executives, salesmen and teachers were much higher than those of clerks and unskilled laborers. It was also shown that students who engaged in many extracurricular activities scored higher than those who participated in few or none at all. The failure to partial

out the variance attributable to abstract intelligence was unfortunate however. These differences between the groups could have been due to the highly verbal content of the social intelligence test.

Hunt (1928) justified the use of the test by showing how social intelligence plays an important role in a student's academic as well as vocational success:

> Numerous examples of brilliant students who fail in the vocational world, or persons of mediocre mental ability to make "shining successes" in human engineering point to the need.

She defined social intelligence as the "ability to deal with people." Her validation study was successful, to a certain degree, in differentiating various groups, i.e., occupations which require a great amount of relationship with people showed high scores while those which require no such ability scored low. But the test is not clear-cut: it correlated highly with abstract intelligence. In Woodrow's study (1930) social intelligence tests were classified under tests related to the verbal factor because they correlated highly with tests of verbal facility.

Rhinehart (1933) used Moss' Social Intelligence Test in his study of the predictors of success among student

nurses. The study did not give any significant result for the social intelligence test. This corroborated Hunt's (1928) findings where nurses' median scores were second to the lowest - just thirteen points higher than lower grade industrial workers.

Abt (1949) obtained a similar disappointing result. He hypothesized that since magazine editing entails group work, a good magazine editor should be able to deal with people better than a poor one. The Moss' Social Intelligence Test failed to discriminate between good and poor magazine editors.

The relationship between personality and psychological ability was studied by Wedeck (1947). He defined psychological ability as an "ability to judge correctly the feelings, moods, motivations of individuals" (1947, p. 133). His test battery included four verbal tests, three non-verbal tests and eight "psychological ability" tests. Using Spearman's method of factor analysis, the tetrad-differences technique, the results revealed three factors: "g" factor, "v" factor and a psychological factor. Two verbal tests, Disarranged Sentences and Proverbs, loaded highly on the psychological factor. This was attributed by

Wedeck to the "affective" characteristic of language. He concluded that a person's score in the psychological test would also reveal a personality variable - the degree of affectivity or sensitivity.

Guilford's (1967) proposed systematic classification of primary intellectual abilities consists of 120 or more independent abilities, thirty of which deal with behavioral content (See Figure 1).

Each trigram in Figure 2 represents a combination of operation, content, and product, respectively. For example, the trigram CBU means Cognition of Behavioral Units, i.e., the awareness and understanding of behavioral bits of information. (For a fuller discussion of the three dimensions of Guilford's model see Chapter II).

Two of the five operations of behavioral content have been empirically supported. The study of O'Sullivan, Guilford and deMille (1965) showed the existence of cognitive behavioral abilities. Twenty-three tests, representing various products involved in <u>behavioral cognition</u>, were constructed. The marker tests were measures of cognition, divergent production and convergent production

Figure 2

The Behavioral Matrix of the Structure-of-Intellect Model

	Cognition	Memory	Divergent Production	Convergent Production	Evaluation
Unit	CBU	MBU	DBU	NBU	EBU
Class	CBC	MBC	DBC	NBC	EBC
Relation	CBR	MBR	DBR	NBR	EBR
System	CBS	MBS	DBS	NBS	EBS
Transformation	CBT	MBT	DBT	NBT	EBT
Implication	CBI	MBI	DBI	NBI	EBI

of nonbehavioral content. These were 24 tests in the reference battery. The study recommended eleven tests as measures of six factors in behavioral cognition on the basis of the individual test reliabilities and factor saturations.

The study of the divergent production of behavioral information was done by Hendricks, Guilford and Hoepfner (1969). They called this particular segment of the SI model "creative social intelligence" because it involves not only the ability of understanding others but also coping with and solving interpersonal problems. The authors constructed 22 tests of creative social intelligence to measure the six products hypothesized in the SI model. The 18 marker tests were measures of SI abilities which have been demonstrated in previous studies. Twelve tests were recommended as reliable and valid measures of creative social intelligence.

It is clear from the analysis of previous writings and research on social intelligence that, with the exception of Guilford's model, many vague and relatively unsophisticated views have been expressed by a variety of psychologists. There is some undifferentiated notion, based on common-sense, that such an entity probably exists, that there is a need to do something about measuring it, but that

there appear to be more urgent priorities. The review of the literature indicates the need for an empirical investigation, parallel to that of Alexander (1935) on "concrete and abstract intelligence", to determine the existence and value of the intellectual ability to deal with people and social situations.

The questions to be answered in this thesis are the following:

1. Are there specific abilities that a person uses in social or personal relationship situations? Is it possible to demonstrate these abilities through group administered tests which have been constructed by using still photographs?
2. Is social intelligence an independent ability?
3. How are the three types of intelligence viz. abstract, practical and social interrelated?
4. Are there sex differences in social intelligence?
5. What is the relationship between social intelligence and scholastic achievement as measured by the grade point average (GPA) as given by teachers' grades?

CHAPTER IV

THE CONSTRUCTION OF THE SOCIAL ABILITY SCALE

Test Materials

Still photographs of expressions of various feelings, emotions, moods, etc., were used in the construction of the subtests of the scale. Studies have shown that in spite of the limitations of photographs, e.g., the absence of the dynamic aspects, photographs adequately embody the general characteristics of feelings, emotions, moods or attitudes portrayed. Langfeld (1918) used sketched pictures from posed photographs of an actor (Rudolph's pictures). The subjects, four men and two women, were asked to interpret the expression shown on the picture. The judgments were good and consistent. Some expressions were easily interpreted - pictures of laughter, anger, hatred, contempt and scorn. Moods such as sullenness and peevishness were interpreted correctly. The temperamental attitudes such as covetousness and pessimism were missed by the subjects. Langfeld expected this particular result because he hypothesized that the effect, not the attitude itself, is

the observable; the attitudes can be observed only through inference. These experiments may have demonstrated only that subjects were capable of recognizing and naming certain conventional representations based on the existing cinematic conventions.

Gates (1925) used 902 schoolchildren, age ranging from three to fourteen (grade ranging from kindergarten to eighth grade) to test the ability to interpret facial expressions, using Ruchmick's pictures. One of the results showed that the children were able to interpret some expressions with ease and some with extreme difficulty; the probable ordering from easiest to the most difficult: laughter, pain, anger, fear, defiance, appeal, scorn, surprise, and a blending of sorrow and joy. Dashiell (1927) employed a different approach to measuring reaction to facial expressions. His main objection to giving names to expressions was the dependence on vocabulary and the effect of this confounding variable on the performance of the subjects. His method consisted of presenting eighteen pictures arranged in four series. A story was told to accompany the presentation of the pictures. The subject was instructed to pick out the picture appropriate to each incident in the story. Dashiell found his approach more

advantageous, i.e., it yielded clearer results than other methods.

In more recent studies of social ability, pictures of facial expressions have been used quite extensively. Wedeck (1947) devised five pictorial tests to use in his study of the relationship between psychological ability (or social ability) and personality. He used works of well-known contemporary artists and still photographs of film actors. The experimental battery included eight psychological tests, (five pictorial and three non-pictorial), four verbal tests and three non-verbal tests. Using Spearman's method of analysis, Wedeck was able to extract two factors beyond the "g" factor - verbal and psychological. Four of the five pictorial tests strongly delineated the psychological factor. O'Sullivan, Guilford and deMille (1965) recommended eleven tests of cognition of behavioral information four of which used mainly pictures of photographs of various expressions. The study of Hendricks, Guilford and Hoepfner (1969) recommended 12 tests to measure creative social intelligence. One test, Alternative Facial Relations, which used photographs of facial expressions was found to be a highly reliable and valid measure of divergent production of behavioral relations (DBR).

Groupings and scales have been suggested to describe more efficiently and accurately facial expressions. Allport (1924) suggested six groups: (1) pain-grief, (2) surprise-fear, (3) anger, (4) disgust, (5) pleasure, and (6) attitudinal. He also outlined in great detail the dynamic and bodily components of each group of facial expressions with respect to the brows and forehead, eyes, nose, mouth, lips, lower jaw and head. Woodworth (1954) developed a scale of emotion categories because he observed that some facial expressions were more apt to be mistaken for other expressions. For example, he observed that Fear was frequently judged as Surprise or Anger but seldom mistaken for Love or Disgust. The same results were observed by Langfeld (1918). Some of the confusions were: strong amazement was mistaken for fear; mild, impotent hate for fear; strong hate for scorn and contempt. He concluded that because some expressions were more similar than others the errors of judgment were not equal. Woodworth's linear scale consists of the following:

I. Love, Happiness, Mirth

II. Surprise

III. Fear, Suffering

IV. Anger, Determination

V. Disgust

VI. Contempt

The scale increased the correlation between pose and judgment (.92) indicating a more accurate judging of facial expressions.

In 1952 Schlosberg suggested the use of dimensions to describe facial expression rather than emotion categories. Schlosberg's scale has two dimensions: (1) pleasantness-unpleasantness, and (2) attention-rejection. Attention, he stated, is the condition wherein "all receptors are maximally open to stimulation" in contrast to rejection wherein the opposite happens. He found out that the error of prediction was considerably less. Schlosberg added a third dimension in 1954 which he called "level of activation" characterized by the bipolar continuum, sleep-tension.

The scope of the present study, however, goes beyond mere judging or interpreting of expressions shown in photographs. Facial and body photographs of affective expressions are used and arranged to portray situations and

conditions wherein the "social ability" of an individual can be exercised.

The Photographs

Fifteen students of the Victoria Composite High School Performing Arts Department, and one Drama student of the University of Alberta posed for the photographs. Of the 16 models, five were males and eleven females. A week before the picture-taking session a list of expressions were given to the students. They were instructed to study the list and told that they could portray each expression in any manner they decided to. The list contains the following expressions:

1. No expression	16. Jealousy
2. Smiling expression	17. Admiration
3. Ambition	18. Sadness
4. Despair	19. Envy
5. Determination	20. Fear
6. Anger	21. Joy, Happiness
7. Disappointment	22. Contentment, Satisfaction

8. Approbation
9. Indecision
10. Love
11. Hate
12. Scorn
13. Suspicion
14. Disgust
15. Regret
23. Fatigue
24. Surprise
25. Confusion
26. Dismay
27. Shock
28. Pity
29. Disbelief
30. Sudden recognition of recall or someone or something

If we follow F. H. Allport's (1924) classification of emotions the list can be broken into the following groups:

I. Pain-Grief group

1. Despair
2. Disappointment
3. Regret
4. Sadness

II. Surprise-Fear group

1. Fear
2. Surprise
3. Dismay
4. Shock
5. Sudden recognition or recall of someone or something

III. Anger group

1. Anger
2. Hate
3. Suspicion
4. Jealousy
5. Envy

IV. Disgust group

1. Scorn
2. Disgust

V. Pleasure group

1. Smiling
2. Love
3. Admiration
4. Joy, Happiness
5. Contentment, Satisfaction
6. Pity

VI. Attitudinal group

1. Ambition
2. Determination
3. Indecision

4. Confusion

5. Disbelief

6. Approbation

This writer would like to add another classification or grouping:

VII. Physical State

1. Fatigue

Picture-taking was done at the Audio-Visual Studio of the Education Building. There were two photographers, taking pictures simultaneously. One camera recorded the facial expressions only while the second camera focused on the total body, i.e., the face and the rest of the body. The models decided the pace of the picture-taking since pictures were taken only when they told the photographers they were ready.

There were 960 slides made. The slides were sorted out and matched, facial with total body expressions. The number was reduced slightly after some were discarded because they were either overexposed, underexposed, or blurred.

Evaluation of Photographs

Sixteen judges were requested to evaluate the validity of the photographs, i.e., whether each picture portrayed the expression it was supposed to portray. Two groups of eight judges were formed to facilitate the evaluation of the photographs. Each group was composed of: one professor and two graduate students from the Department of Educational Psychology, University of Alberta, two professors, one graduate and one undergraduate student from the Department of Drama, University of Alberta and one professional photographer. Each group evaluated the facial and body portrayals of eight models.

The scale used contained points ranging from 1 to 5; the explanation of each point is given below:

EXCELLENT (1) - The picture truly portrays the emotion, feelings, mood, etc. In modern slang - "it's right on".

VERY GOOD (2) - There is a very slight reservation as to the validity of the photograph.

GOOD (3) - If the picture contains one or two other expressions.

POOR (4) - The picture portrays only slightly the given expression.

INVALID (5) - The picture does not portray the expression at all.

Below is summarized the procedures followed in the evaluation of the photographs:

1. Each model was given a letter designation - A to P. One group of judges evaluated the facial and body pictures of models A to H, while the second group judges models J to P.

2. Before the start of each session, it was explained to the judges: the objectives of the whole research, what they were supposed to do and the scale to be used.

3. Using a slide projector, the facial pictures of a model portraying the 30 expressions (as given on page 44 - 45) were shown successively with five seconds interval between pictures.

4. Using another slide projector, step 3 was repeated, but this time the body pictures of the same model were shown. The judges were advised to fold the judging sheet so the ratings for the facial pictures would not affect those of the body.

5. Steps 3 and 4 were repeated for every model.

6. A break was given after showing the fourth model or anytime a judge would want one.

The results of the evaluations are summarized in Tables 16 and 17. The pictures rated Excellent were used in the subtests wherein specific expressions are to be found. Those that were rated Poor and Invalid were used as wrong alternative answers. Item difficulty was controlled by the use of the rated pictures. For example, to make an item easy, one Excellent picture was used with four Poor or Invalid pictures; a difficult item would be to place Very Good pictures with one Excellent picture.

The Test Battery

Guilford's SI model was used as a guideline in the construction of the subtests. The tests were developed to measure each of the five operations indicated by the SI model. The product dimension of the model was not taken into account. Five types of tests were developed: (1) Tests of Cognition, (2) Memory Tests, (3) Tests of Divergent Production, (4) Tests of Convergent Production, and (5) Evaluation Tests.

<u>Tests of Cognition</u>

<u>Recognition of Similarities (Face vs. Face)</u>. The standard stimuli and the alternative answers are all facial expressions. The test consists of finding among the five alternatives one that contains the same expression as the standard picture.

The test is parallel to finding the synonyms in a vocabulary test. The Synonyms test was found to be a strong measure of cognition of Semantic Units.

<u>Recognition of Similarities (Face vs. Body)</u>. The standard pictures are facial while the alternatives are body pictures. The test is similar to the first test.

The body, through the movements and positions of the arms, hands, and the body itself completes the information obtained from the face. There is never a contradiction between the body and the face in the expression of any effective state. Eckman (1965) however suggested that the head and the body communicate different dimensions of the affect: the head cues indicate the particular affect being experienced while the body cues indicate the level of

arousal or the intensity of the experience.

Differences. Five pictures are presented in a row - they may be all faces, all body or combination of both. The picture that shows a different expression from the rest of the four has to be picked out.

To be able to select one that is different from the other facial expressions one has to comprehend what each picture expresses.

Memory Tests

Pairing Expressional Names with Faces. The study page contains full-face pictures with emotional names below each one of them. The test page contains the names with rows of five pictures after them one of which was paired with the given name in the study page. In this test only pictures rated Excellent were used. To avoid unnecessary cueing all five alternative answers portray the expressional name given.

Picking Out Familiar Faces from a Group. The study page contains ten sets of three pictures. The test pages present ten rows of five pictures; each row contains a set of three picture studies and two other pictures which serve as distractors. One or two pictures from the original set are indicated by a cross-mark below the picture or pictures. The examinee has to find the other picture or pictures to complete the original set.

Completing the Original Pair. Pairs of pictures are studied. The test consists of selecting from a page containing twenty pictures one that would complete the original pair as in the study page.

Tests of Divergent Production.

Grouping Pictures to Show a Common Expression. Twenty pictures are shown on a page. As many groups of at least three pictures are formed provided each picture in the group shows the same emotion, feeling, attitude, mood, condition or state.

Actually there was a limit on the number of groups that could be formed. This writer originally formed five groups of four pictures using only the pictures rated

Excellent. Nevertheless, the test should still be able to measure the person's ability to produce something new out of what are given (dependent on a criterion); in this particular case to form smaller groups of pictures out of a pool of pictures each small group showing a common expression. Included in the directions was the instruction to use a picture only once.

Grouping Pictures to Show a Continuing Expression. Five rows of five pictures are presented on a page. Using only one row at a time the five pictures are arranged and rearranged so that the pictures tell a continuing expression of emotion or feeling or attitude, etc. The series of expressions may consist of any combination of expressional states. The five pictures in a row can be rearranged as many times as possible. The subject(s) is instructed to give a word, or phrase or a short sentence to indicate the expression shown at every stage of the series.

What Does the Person Say? There are five pairs of facial pictures. The picture on the left of the pair indicated Person A while on the right is Person B. The test consists of putting words into Person A's and Person B's mouths. The directions consist of: What do you think Person

A is saying to Person B? What do you think was Person B's reply? As many Person A - Person B short dialogues can be given as the student wishes.

The test runs the risk of having a high verbal saturation. However, it was assumed that the heavy expressional content would tend to eliminate or decrease significantly the verbal loading.

Tests of Convergent Production

Expression Naming. Below the twelve pictures arranged in three rows of four pictures is a list of expressional names. Each picture is to be labeled by selecting a name from the given list. Only pictures rated *Excellent* were used.

Whereas many answers are possible in tests of divergent production only one is possible in convergent production. In *Expression Naming* the test requires deciding on one correct label after considering a few alternatives. A better test situation would have been to present the pictures without the accompanying list of expressional names. This writer, however, had reservations about the

method because of the possibility of the test becoming heavily loaded on the verbal factor which would obscure the behavioral effect.

Matching Face with Body. A body picture is chosen to match a facial picture in portraying an expression. Neither the face nor the body need belong to the same person.

The test would appear to be a measure of cognition. However, it was predicted that even if there would be a loading on the cognition factor it would be slight. The test would measure convergent production significantly. The reason lies in the slight difference involved in the method of the test presentation. In Recognition of Similarities (Face vs. Body) the operation is simpler because only five alternatives are given. In _Matching Face with Body_ the operation extends beyond simple recognition. The correct answer has to be picked out from a large pool of pictures hence not only understanding is involved but also memory (the standard stimuli have to be many possible answers) before deciding on the _one_ correct picture.

Completing Faces. The test is divided into two parts: (1) the first part shows faces with eyes and nose missing, (2) the second part shows faces with mouth and chin missing. Directly below each segment of the tests are eyes-nose or mouth-chin combinations which would complete each face in showing an expression. An alternative answer can be used only once.

The features of the face are very mobile but yet modified when expressing an emotional state. Allport (1924) in his synopsis of facial expressions indicated that for a movement or position of one facial feature there is a corresponding movement or position of all other features unique to a group of expressions. Since the eyes and the mouth are the most expressive features the test was constructed to test the ability to choose the correct eyes or mouth, as the case may be, to match the feature given. To make the test not too difficult the eye portion contains the tip of the nose to the edge of the hairline on the forehead while the mouth portion consists of the end of the nose to the chin. All the incomplete pictures have the crown of the head and the portion from the chin down.

Evaluation Tests.

Finding the Exact Picture. The standard picture and those of the alternative answers belong to the same person. One of the five choices is _exactly_ the same one as the standard picture.

Finding the Exact Picture is parallel to Thurstone's (1935) _Identical Forms_ which has been consistently used as a marker test of perceptual-speed factor. Guilford (1967) identified the factor with evaluation of figural units (EFU) because matching and also decision as to the identity versus nonidentity are involved. The reason why the factor has been named "perceptual speed" is due to its high speededness. The time limit has to be short; the test is so easy that if sufficient time is given perfect marks are obtained. It may appear that _Finding the Exact Picture_ is a cognition measure but the test involves not only recognition but also matching and judging of matches, whether to reject or accept it.

Opposites. One of the five alternative answers shows the opposite expression portrayed by the standard picture. The pictures used in the construction of the test were those rated _Excellent_.

Using the expressions given on page 44 - 45 and referring to a book of antonyms, six pairs of of opposite expressions were formed: love-hate, contentment-ambition, approbation-scorn, indecision-determination, happiness-despair, and admiration-disgust. Although more complicated and more difficult than _Finding the Exact Picture_ the test also requires matching the standard picture with each of the alternative answers, accepting or rejecting the match at each successive stage. A verbal loading can be anticipated since it also requires labeling of each expression at each match.

Pairing Names with Body Pictures. The standard stimuli are expressional names while the alternative answers are body expressions. The names are matched with the correct body picture.

The test involves labeling or naming pictures and appears to be a convergent production test. However the strategies involved are different. In convergent production many possible labels or names are considered before accepting one correct name. In _Pairing Names and Body Pictures_ the name has been given but it has to be matched

with each of the alternative pictures making a judgment of each match.

CHAPTER V

THE VALIDATION OF THE SOCIAL ABILITY SCALE

The Sample And Procedure

The Sample.

There were no restrictions imposed on the selection of subjects. The heterogeneity of the group assured, to a certain degree, width of variation in ability. In addition, since the sample was drawn from the same school there were two advantages anticipated: (1) homogeneity of the group in terms of school environment, i.e., having the same teachers and classmates and exposure to the same school activities; and (2) most of the students came from the same residential district of the city. The latter advantage can be considered as controlling the effect of socio-economic factor which may have a direct effect on the way an individual responds to social or personal situations.

The subjects for the validation study were 186 students of the Archbishop MacDonald High School. The subjects ranged in age from 14 1/2 to 19 years old. There

were 61 Grade X, 52 Grade XI, and 73 Grade XII.

The Procedure.

The preliminary testing. A "dry run" was performed to determine the appropriate time limit of each test and the order by which the tests are to be given to obtain the best possible results. The test battery was administered to ten students of the Archbishop MacDonald High School. The test battery was divided into two parts: the first part included the tests using IBM answer sheets and the second included the tests where the answers have to be written down on separate answer booklets. A break was given after the first part. Table 2 shows the test schedule followed.

The whole testing process which included giving of directions, actual testing, answering questions while the test was in progress and the break took over two hours. This was considered too long. An effort was made to limit the testing period to one class period (55 minutes). The battery had to be reduced and the following tests were excluded:

Test II-B Picking out Familiar Faces from a Group

Test III-A Grouping Pictures to Show a Common Expression

Test III-B Grouping Pictures to Show a Continuing Expression

Test III-C What Does the Person Say?

No test of divergent production was included in the test battery owing to the length of time the test involves. However, on the basis of the verbal report of the subjects it was decided to include Test III-C in the main study test battery.

The validation testing. Before the start of the test an introduction and some general directions were given on:

1. The purpose of the research, the general composition of the test battery and why they were chosen to participate in the research study.
2. The basic guidelines in answering the tests. One of the guidelines emphasized the making use of first impressions, i.e., not to study each item and picture in great detail.
3. The use of IBM answer sheets. Most of students have had experience with the answer sheet.

The exclusion of the four tests reduced the test battery to eleven tests. The tests were answered right through the end of the class period. No break was given between the two parts of the test. The same order of the

individual tests was retained in the validation testing. The actual testing period was reduced to 38 minutes plus introduction and general directions - it was long enough for one class period.

Analysis of Results

Item Analysis

Two separate item analyses were performed on Part I and Part II of the test battery. The reliability coefficients, using the K-R formula, were .64 and .44 respectively. The average coefficient was .54. The results of the analyses together with the results of other statistical analyses are summarized in Table 8.

Correlational Study

A Pearson correlational analysis was carried out on the eleven Social Ability Scale (SAS) subtests plus five non-ability variables: Sex (S), Grades (G), Parents' Occupation (PO), Family Size (FS) and Sibling Status (SS). The indexes used with the non-ability variables is shown below:

Sex (S)

1 - Female

2 - Male

Grade (G)

1 - Grade X

2 - Grade XI

3 - Grade XII

Patents' Occupation (PO)

1 - Both parents professional

2 - Only the father professional

3 - Only the mother professional

4 - Both parents' nonprofessional

Family Size (FS)

1 - Number of children in the family greater than 3

2 - Number of children in the family less than 3

Sibling Status (SS)

1 - Eldest

2 - Middle

3 - Youngest

4 - Only child

The correlations are shown in Table 3.

There were only eight significant intercorrelations among the SAS variables (p's ranging from .0004 to .05). Sex

correlated significantly, all negative, with five SAS tests - Test I-A, Test II-A, Test V-B, Test IV-B and Test IV-C. Grade did not have any significant correlation with the rest of the variables. The same was true with Sibling Status. Family Size correlated with Parents' Occupation. No significant intercorrelations existed among the five non-ability variables.

Analysis of Variance.

Sex and Grade were used as independent variables in two separate analysis of variance with measures on the second factor. In Table 18 is presented the results of the analysis where Sex was used as the classification variable. The mean effect of Factor A (Sex Category) is highly significant, p=.00015. Neither the mean effect of Factor B (SAS II subtests) nor the Sex-Social Ability Scale variables interaction effect is significant.

Table 19 shows the results of the analysis with Grade as the independent variable. None of the effects is significant.

Factor Analysis

The Hendrickson-White method, with hierarchical solution, was used to factor analyze the intercorrelations among the 16 variables included in the validation study. The method has the following advantages:

1. It can indicate the presence of higher order factors and reveal the nature of the higher order factor pattern.

2. Compared to other hierarchical solutions, Hendrickson-White method gives higher-order factor pattern in terms of the original variables. The higher-level factors relations, orthogonal and oblique, involve the original variables. Hence, interpretation of higher-order factors can be made in terms of the variables one started out with in the analysis.

The principal axes method of factoring revealed seven factors with eigenvalues less than 1.00. These factors were retained for subsequent orthogonal rotation using the varimax method. Table 4 contains the matrix of the unrotated factors. It was hypothesized, initially, that the factors are correlated rather than independent of each other. Therefore, the orthogonal axes were rotated obliquely using the promax method. This resulted in the increase or reduction of the orthogonal factor loadings which made the

pattern clearer and clearer; the factors were more delineated. Table 21 and Table 5 show the factor pattern of both varimax and promax rotated factors of the first solution. Only factor loadings of less than .30 were considered significant and used in the interpretation of the factors. The first solution accounted for 58% of the total variance.

The correlations among the seven first-order factors were computed and factor analyzed using the principal axes method. Three second-order factors were revealed. The projections of the original variables on these factors were found. The three axes were then rotated orthogonally and obliquely using the varimax and promax methods respectively. The results are presented in Tables 6 and 22 and are discussed in the preceding paragraph.

The same method was used on the three second-order factors. The third solution revealed one third-order factor. No further analysis was needed. The results of the third-order solution are shown in Table 7.

Interpretation of Results

The reliability of the Social Ability Scale, as a whole, was not very high, only .54. However, the method used to obtain the reliability index of the test battery is a measure of internal consistency. The test battery was designed to measure various dimensions of social intelligence which are hypothesized to be independent of each other. If the reliability coefficient were very high it would have meant that the test battery measured the same dimension of social ability. Therefore, the reliability coefficient of .54 can be considered satisfactory in this case. It is high enough to indicate that the tests were measuring something in common yet low enough not to measure the same dimension.

A high coefficient of internal consistency should be expected from the individual subtests. Table 8, column 5 shows low reliabilities, ranging from .08 to .69. But it should be realized that each test of the battery is short; the longest test has only fifteen items. Column 6 shows the reliabilities if the individual tests were lengthened five times bringing the number of items to around 50 which is the

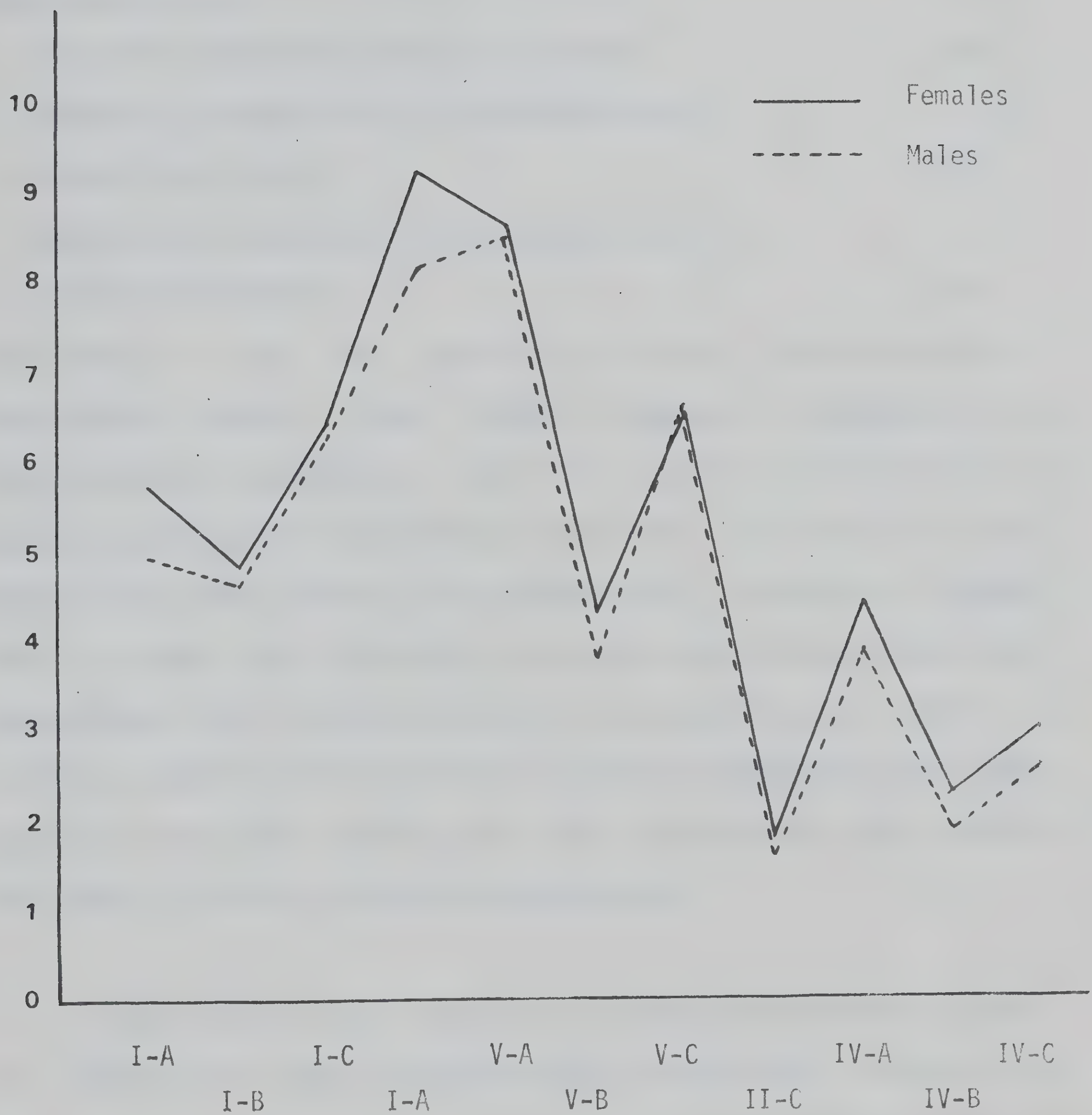
length of most standardized tests.

Another finding, gleaned from the results of the analysis of variance is an indication of sex differences in social ability. The main effect of Factor A, sex category, is highly significant. It indicates that a considerable amount of variance is due to sex differences. The diagram in Figure 3 shows the subtest means of male and female subjects plotted for comparison. The same pattern is shared by both sexes although the means of the female subjects are consistently higher than those of the men. Using the Newman-Keuls test of significance of mean difference it was found that in two variables, Test I-A and Test V-A, the means were significant at .05 level. The results indicate that female subjects were significantly better at recognizing similar facial expression and finding exact pictures than male subjects.

The various factors involved in social ability were revealed through the results of the factor analysis. The oblique factor pattern matrix is used in the discussion of results. The first-order factors indicate the specific dimensions of social ability. There are six specific ability factors; the seventh being a non-ability factor

Figure 3

SAS Subtest Means For Male And Female Subjects



characterized by the variable Sibling Status which has a high loading of .93.

The first-order Factor I is characterized by the following tests:

Test IV-B Matching Face with Body	.86
Test I-A Recognition of Similarities I (Face vs. Face)	.50
Test I-B Recognition of Similarities II (Face vs. Body)	.49

This seems to be the Cognition factor hypothesized in Guilford's model. The tests require recognition of similarity in expression. Test IV B was constructed to measure convergent production because initially it was thought that the process of picking out a correct picture from a pool of pictures would be more complex than mere recognition. The results, however, showed that the type of testing used did not alter the operation employed; the test requires basically nothing more than recognizing one picture from many to match a facial expression.

The first-order Factor II is best identified by Test V-A, Finding the Exact Picture with a very high loading of .89. The test involves reasoning and judgment-comparing two

facial pictures and deciding whether to accept or reject the match. The other variables are:

Test IV-A Expression Naming	.67
Test I-C Differences	.49

Expression Naming and *Difference* were constructed to measure convergent production and cognition respectively. The clustering of these tests with Test V-A seems to indicate that labeling a picture with an expressional name and picking out the one which is different from the rest require a great deal of reasoning, judgment and decision-making.

Factor III of the first solution is definitely a memory factor. Test II-C involves studying pairs of pictures and reproducing the original pairs after a time interval. The other memory test constructed, Test II-A, *Pairing Expressional Names with Faces*, failed to load significantly on any of the seven factors. It has a positive and moderately high loading on this factor, .27.

The rest of the factors are each characterized by one variable each:

Factor IV Test V-B Opposites	.81
Factor V Test V-C Matching Expressional Names with Body	.80

Factor VII Test IV-C Completing Faces .83

Factor VI is not included in the interpretation since it is characterized by a non-ability variable, Sibling Status, having a loading of .93.

The second-order factor pattern is shown in Table 6. Each factor accounted for approximately a third of the common variance. The hypothesized groupings of some variables (with reference to the test battery) are shown in the second-order solution.

Factor I seems to be a group factor which involves recognition, memory and evaluation or judgment. It also indicates an ability to deal with facial expressions solely - all the tests, except Test II-C and Test IV-B, involving facial pictures. The following are the variables loaded on the factor:

Test IV-C Completing Faces	.65
Test II-A Pairing Expressional Names with Faces	.47
Test II-C Completing the Original Pair	.46
Test I-A Recognition of Similarities I (Face Vs. Face)	.36
Test IV-A Expression Naming	.35
Test IV-B Matching Face with Body	.30

Test II-C indicates that a strong memory ability is involved while Test I-C the evaluative dimension of the group factor. Test IV-B, with a loading of .29, seems to gravitate around this factor because of its strong recognition content. There is verbalizing or labeling of expressions or "reading meaning into pictures" as indicated by high saturation of Test II-A. In summary, Factor I indicates a multidimensional group ability which deals with the affective expressions shown on a face or faces.

The second group factor, in contrast to the first, deals with face- body relationship. It involves similar and dissimilar face-body expressions and strong judgment or evaluation. There is also an indication that verbalization and labeling of expressions precedes other operations. The following variables characterize Factor II:

Test I-B Recognition of Similarities II (Face vs. Body)	.45
Test V-B Opposites	.45

The third group factor indicates an ability involving the operations of cognition and evaluation but on the <u>now</u> aspect of the material. This factor is characterized by:

Test I-C Differences .63

Test I-B Recognition of Similarities II (Face vs. Body) .58

Test II-C Completing the Original Pair -.34

Test II-C is a measure of memory; Test I-A and Test I-B were identified to look on the Cognition factor while Test I-C on the Evaluation factor.

The Social Ability factor is shown by the third-order factor solution. As Table 7 shows all the variables load positively on this third-order factor with Test II-A having the highest loading (.56) and Test II-C the lowest (.13).

Test Selection

A test representing each factor, except for Factor V, was selected to be included in the test battery for the main study. The selection was made on the basis of the results of the item analyses and factor analysis.

For Factor I the most logical test would have been Test IV-B since it was the most valid with the high loading

of .86. Upon examining the entries in Table 5, however, one can see that the test is not a very efficient one because: (1) the reliability is quite low, .12, (2) the difficulty levels are low, ranging from .03 - .53, (3) the mean and standard deviation are also low. Since it is a difficult test and the range of variation is very narrow the discriminatory ability of the test is almost nil. Comparing Test I-A and Test I-B, Test I-A is the better test because the reliability is the highest among the three and the mean corresponds to half of the total number of items in the particular test. Test I-A is not a very difficult test, range is from .32 to .73.

To represent Factor II Test I-C was chosen. To show why a summary of the descriptive statistics of the tests involved is shown:

TESTS	FACTOR LOADING	K-R 20	MEANS	S.D.	RANGE OF DIFFICULTY LEVELS
1. TEST V-A	.89	.53	8.54	.83	.84 - 1.00
2. TEST IV-A	.67	.37	4.09	1.88	.04 - .63
3. TEST I-C	.49	.38	6.33	1.62	.17 - .91

Test V-A is a valid test with high internal consistency coefficient. But it is an extremely easy test shown by the difficulty levels, very high mean and very low standard deviation. The discrimination index of the test is zero. Test IV-A seems to be a reasonable test. However, it is a difficult test and would discriminate inadequately.

Test II-C was selected to measure the memory dimension of social ability. The test is a poor one judging from its reliability (.28), mean (1.69), and the range of difficulty levels (.07 - .27). Test II-C was still chosen because the test can be improved by the lengthening of the time allotment of studying the pairs of pictures and by stating clearly in the directions that it is a memory test.

Test V-B, Opposites was chosen as well as Test IV-C, Completing Faces. Opposites is a reasonable test despite its

range of difficulty levels. Test IV-C has a very low reliability coefficient but this can be explained by the number of items left unanswered. This deficiency might be solved by lengthening the testing time limit.

In summary, the following tests were chosen as measures of social ability in the main study test battery:

Test I-A Recognition of Similarities I (Face vs. Face)

Test I-C Differences

Test II-C Completing the Original Pair

Test V-B Opposites

Test IV-C Completing Faces

Test III-C What Does the Person Say?

The last test, constructed to measure divergent production was not included in the actual validation study but included in the preliminary testing.

CHAPTER VI

The Comparative Study of Social Intelligence

The Sample

A group of 103 students of the Archbishop MacDonald High School was chosen initially for the main study. The group was different from the sample used in the validation study of the Social Ability Scale. However, some students dropped out of school before the testing was finished and the final sample was decreased to 99 students.

The students belonged to three class groups. An effort was made to maintain a close ratio between female and male subjects. The sample had the age range similar to that of the validation study, 14 1/2 to 19 years old. There were 40 Grade XII subjects, 23 Grade XI, and 36 Grade X. Fifty were females and 49 males.

The Variables

There were three other variables included in the second study beside social intelligence and five non-ability

variables such as: sex, grade, parents' occupation, family size and sibling status. These variables are abstract ability, practical ability, and scholastic achievement.

Abstract ability. This type of intelligence refers to the individuals' capacity for abstractions; his ability to deal with thoughts, concepts, principles, ideas, generalizations and other nonconcrete, ideational subject matter. Psychologists, past and present, have tended to consider abstract ability as the higher form of mental manifestation. Spearman (1927) subscribed to a unitary factor of intelligence, the "g" factor, which is characterized by the processes of education of relation and education of correlate, characterizes, in turn, abstract intelligence. He considered abstraction as the ultimate, the apex of eduction. Motor abilities were low-level abilities wherein only a small amount of "g" was needed because of the narrowness of the breadth of the operations involved. One other reason was stated thus (1927, p. 217):

> But a further explanation can be found in that these operations bring largely into use the peripheral parts of the nervous system, and even the non-verbal structures. These, by universal consent, do not subserve mental processes directly, but only influence them indirectly.

The capacity to abstract facilitates the ability to transfer

from simpler situations to more complex ones. In Burt's (1949) hierarchical structure of the mind abstract intelligence underlies the two highest of cognitive processes. The highest level, Relation, is dependent upon explicit or implicit apprehension of abstract relations. Scientific or logical thinking and aesthetic processes belong to the relational level. The next lower level, Association, is described by memory, productive association, imagery, verbal ability and arithmetical ability. He found, beside the general cognitive ability, two other factors common to all levels - speed and attention. In Vernon's (1950) hierarchical conception of abilities the "g" factor branches into verbal-educational (v:ed) and kinaesthetic-mechanical (k:m). The v:ed factor is further broken down into verbal ability and numerical ability. It is clear that the v:ed dimension of the "g" refers to abstract ability. (The k:m factor will be discussed in conjunction with mechanical or practical ability). Guilford's morphological structure-of-intellect model designates symbolic and semantic information as two kinds of abstract intelligence. The cubic representation of the human mind also explains the operations employed and the products of the operations of abstract intelligence.

A departure from the structural representation of human abilities is Thurstone's primary mental abilities. These abilities are separate but not totally independent of each other. The factors, identified as Spatial, Perceptual, Numerical, Verbal, Fluency, Memory, Reasoning and Deduction are all descriptive of abstract intelligence. However, two factors, Spatial and Perceptual, have been shown to consistently appear in the factor analytic studies on the nature of mechanical ability.

In the present study, the measures of abstract intelligence were three subtests of the Differential Aptitude Tests (DAT). The DAT was formulated with Thurstone's primary mental abilities as the theoretical framework. The tests chosen were:

<u>Verbal Reasoning (VR)</u> - The test requires choosing from among five pairs of words one to fill the blanks so as to satisfy the required relationshipp.

<u>Abstract Reasoning (AR)</u> - One of the five alternative figures has to be chosen to complete a series of four figures.

<u>Space Relations (SR)</u> - The subject has to choose from among four figures one that would produce, if

the sides are folded, the pattern shown.

Due to the limitation in the length of testing time only half of the original number of test items were included. The items picked out were the even ones.

Practical ability. As opposed to the purely mental activity involved in abstract intelligence, practical or mechanical ability involves concrete material, something that can be directly acted upon by the senses and manipulated by the various parts of the human body - by the hands, feet, arms, etc. This is the type of ability employed in all types of manual activity which could range from a simple activity as finger tapping to the more complex psychomotor performances.

As mentioned earlier, the "g" factor in Vernon's model branches into verbal- educational and kinaesthetic-mechanical factors. The v:ed dimension was identified as descriptive of abstract intelligence. The k:m factor, subclassified into space ability, manual ability and mechanical information, is clearly identifiable with practical or mechanical. A more detailed description of mechanical intelligence can be gleaned from Burt's model. The ability is found among the lower levels of cognitive

processes. The _sensations_ and _movements_, which predominate the lowest form of mental activity, combine to become _motor capacity_ in the Perceptual level. The subfactors characterizing motor capacity are: strength, steadiness, quickness and skill or dexterity of muscular actions. At the level of Associatiion, one of the abilities is _practical ability_ which can be broken down into spatial and mechanical factors.

Various studies on mechanical ability confirm the hypothesis of Burt and Vernon. Harrell (1940) made a comprehensive study of the various tests already in use: the Minnesota battery of mechanical ability tests, the MacQuarrie tests of mechanical ability, O'Connor's Wiggly blocks and the Stenquist picture matching test. The results of the factor analysis, using Thurstone's centroid method, revealed the following factors: perceptual speed, youth or maturation, manual dexterity or agility and spatial. His conclusions were: (a) mechanical ability tests in use at that time were composed principally of perceptual and spatial factors; (b) common factors are involved which can be identified as "g" and speed; (c) paper-and-pencil tests can be used to measure mechanical ability. It is worth repeating that Burt found _speed_ as one of the factors that

has an influence on all levels of cognitive processes in the hierarchical structure.

Wittenborn (1945) in his study of the nature and measurement of mechanical ability found that factors derived from the analyses of mechanical ability tests appeared to be of two types. He tentatively labeled them "mental" and "motor". The "mental" type factors were described by abilities as scholastic, spatial visualizing and perceptual. The "motor" type were characterized by dexterity, repetitive movement and steadiness. In the analysis of his data Wittenborn identified the following factors: size or maturation, strength, spatial visualizations or relations and manual dexterity. On the relation between size and strength he concluded that these two variables are highly correlated among young subjects but become increasingly independent as age increases. Almost the same set of factors were found by Chapman (1948) in the study he did on the MacQuarrie Test of Mechanical Ability. He labeled the factors as: spatial, motor, and manual agility.

One factor which had been consistently mistaken for either manual dexterity or finger dexterity was identified by French (1951) as separate from either one of the two

mentioned. French labeled the factor as psychomotor coordination. The ability involved in psychomotor coordination, as Dudek (1948) found out, is more complicated than the abilities involved in either finger dexterity or manual dexterity. Psychomotor coordination, involves, as the name implies, close coordination between parts of the body - eyes, hands, feet, arms, etc. - visualization and perceptual speed. It is a very "mental" type of mechanical ability.

The measures of mechanical ability in this study were the subtests of the Alexander Performance Scale (APS). Alexander (1945) formulated the scale to provide an objective norm on the selection of students who would most likely succeed in a secondary technical school but would perform miserably in a grammar school. The scale was an offshoot of his study on the two types of intelligence, concrete and abstract which he published in 1935. The APS manual provides a method of converting the total score into a <u>practical ability ratio</u> which can be interpreted in the same manner as the intelligencd quotient. As with I.Q., the table of norms provides practical ability ratios up to the age of sixteen. The APS is an individual test. The tests included in the the scale are:

Passalong (PA) - The test consists of moving or rearranging red and blue rectangular or square blocks, without lifting any of the blocks from the tray, so that the final arrangement is similar to the pattern shown on the card. The card containing the model is shown the whole time the subject is doing the task.

Block Design (BD) - The test materials are cubes with four sides painted red, blue, white , or yellow and the other two sides the combinations of red and white, blue and yellow. The task consists of making a pattern, using the cubes, which would be similar to that shown on the card. The pattern or the model is shown while the subject is doing the task.

Cube Construction (CC) - Unpainted and painted (in red) blocks are used. The number of sides painted in red varies for different blocks. The number of sides painted ranges from one to three. The test consists of replicating the building of blocks after a demonstration. The model or pattern is shown while the task is being completed, but the model is never examined or turned over while the task is being completed.

Scholastic achievement. The variable, as used in the present research, refers only to the academic success of an individual in a regular high school. The limitation is necessary because norms of success in different educational settings vary. The criterion of success in a regular high school would be different from the one used in a technical or vocational school. Furthermore, different criteria can be used in the evaluation and measurement of scholastic success even in the same type of school.

To what degree does each type of intelligence contribute to the success of a student in a regular school? One can almost say outright that abstract intelligence is the key contributing factor to scholastic success. If one goes through each student's program examining the courses being taken, the preceding statement can easily be substantiated. Abstract ability is needed in the courses such as Math, English and Chemistry, to name a few. But Thorndike had stated (1927) that abilities are correlated, i.e., in the mental domain the law of correlation rather than compensation is true. Even if abstract intelligence predominates, the other types of abilities must have an influence on a student's performance at school. The correlation between the measure of success and the measures

of the three types of intelligence would indicate the degree of interrelationships of the variables.

The grade point average (GPA) was used as the index of a student's scholastic achievement. It would have been more advantageous to correlate the marks on the individual courses with the measures of abstract, practical and social abilities. This was impossible, however, since students were taking different courses.

The Testing

The testing took place from late September to December, 1972. The administration of the APS to 103 students took the longest. Only five students, at most, could be tested in a day. The individual testing took place at the Resource Center of the Archbishop MacDonald High School.

The DAT subtests were given after all the students had done the APS. A class period was required in answering the DAT. The SAS was administered last. Again, a class period was used in answering the scale.

Table 9 shows the information regarding the test battery.

<u>The Scoring</u>

The results were manually scored with the exception of the DAT results. The responses on the DAT were made on the IBM answer sheets which were optically scored. The scoring of the APS subtests was done either during or after the administration of the scale.

The SAS subtests, with the exception of *What Does the Person Say?*, were scored by hand. The responses to the subtest could not be scored objectively. The test required the subjects to write one-sentence dialogue representative of the expressions portrayed by the pairs of pictures shown. Each dialogue given had to be evaluated, therefore, not only for its appropriateness but also for the quality of the idea being expressed. To obtain a less biased and more objective mark the responses were evaluated independently by this writer and the supervisor of this thesis. Then the average was obtained and entered as the subject's score for the subtest.

<u>Analyses of Results</u>

Before any analysis was performed the sets of data were transformed using the T-score method to insure normality of the distribution.

<u>Correlational Study</u>

The Pearson correlation coefficients were found between the 21 variables which included, beside the 13 ability variables, five classification variables and the three total scores for the subtests of each ability measure. The total scores were included to know the degree to which each subtest correlated with the whole measure and to have an indication on how each ability measure and scholastic achievement relate to one another. Table 10 shows the intercorrelations of the 21 variables.

The intercorrelations between the APS and DAT variables were all positive and highly significant, the lowest probability level of the values of the correlations being .00098. The SAS variable, <u>Recognition of Similarities</u> correlated significantly with <u>Passalong</u> and with all the DAT

subtests. *Opposites* had a negative significant correlation with *Spatial Relations* while *Completing Faces* had a slightly significant positive correlation with *Passalong* and *Abstract Reasoning*.

The close relationship between the APS and DAT measures was shown also in the subtest-total correlations. Not only did the subtest scores of the APS correlate significantly with the APS total scores but they also correlated highly with the DAT total scores. The same trend came out with the DAT subscores and the APS total scores. Only *Passalong*, *Verbal Reasoning* and *Abstract Reasoning*, of the APS and DAT variables, correlated significantly with the SAS total scores. All the SAS total-subtest correlations were significant and positive.

The scholastic achievement measure, the GPA, correlated significantly with only five of the twelve ability measures: *Block Design*, *Cube Construction*, *Verbal Reasoning*, *Abstract Reasoning* and *Recognition of Similarities*. It appears that scholastic achievement is related to some aspects of each of the three types of intelligence. The correlations between the GPA and the total scores of the APS, DAT and SAS corroborated the above

statement. In spite of the fact that only one SAS subtest correlated significantly with GPA the correlation between SAS and GPA was still slightly significant, p = .021. Both APS and DAT correlated very significantly with GPA, p = .004. There was a slight significant correlation between SAS and DAT, p = .021 The relationship between SAS and APS was positive but not significant.

Analysis of Variance

Sex as independent variable. Three separate analyses of variance were carried out on the APS, DAT and SAS data. Tables 23, 24, and 25 show the results of the analyses.

The main effect of the sex category factor (A) on the APS data was highly significant, the probability level of the overall F-ratio was .00008. The test of significance of the differences between the means of male and female subjects, using the Newman-Keuls method, showed significant differences in all three subtests at .05 level. The difference of means in Block Design was also significant at .01 level. The means of the male subjects were consistently higher than those of the female subjects in all three subtests.

The same trend was revealed in the results of the analysis of variance of the DAT subscores. There was a significant main effect of the sex category. The means of the male subjects were higher than those of the females in the three subtests. But only in _Abstract Reasoning_ and _Spatial Relations_ were the differences of means significant, both at .01 and .05 levels. The difference between the pair of means in _Verbal Reasoning_ (4.71), was just slightly less than the critical value at .05 level (4.90).

No difference between any of the six pairs of SAS means was significant. The male subjects did a little better in _Recognition of Similarities_, _Differences_ and _Completing Faces_. The female subjects had higher means in _Opposites_, _Memory_ and _What Did the Person Say_?

Grade as independent variable. The results of the three independent analyses of variance with repeated measures of the APS, DAT and SAS data are shown on Tables 26, 27, and 28 in the Appendix.

None of the effects was significant in the analysis of the APS data. There was a slight significant effect of

the grade category factor (A) with the probability level of the F-ratio equal to .0228. Grade XII subjects performed consistently better than either Grade XI or X. But Grade X subjects obtained higher means than Grade XI in Abstract Reasoning and Space Relations. The analysis of the SAS subscores revealed no significant main effect or interaction effect.

Factor Analysis

The Hendrickson-White method with hierarchical solution was employed to analyze the correlation matrix. Thirteen variables were included in the analysis.

The principal axes method of factoring revealed only four factors having eigenvalues less than 1.00. The first factor accounted for one half of the common variance or a third of the total variance. The fourth one accounted for only 14% of the common variance, 8% of the total variance. Table 11 contains the matrix of the principal axes unrotated factors.

The four factors were rotated orthogonally using the Varimax method. The orthogonal axes were then rotated

obliquely, using the Promax method, in order to obtain the first primary factor pattern. (It will be restated here that the oblique rotation has the advantage of giving clearer and sharper structure because the saturations in the orthogonal dimensions are either decreased or increased when the axes are rotated obliquely. This results in easier and more meaningful identification of the factors). The results of the orthogonal solution are shown in Table 29. Table 12 contains the matrix of factors rotated obliquely, first solution.

The second solution revealed one factor, i.e., one factor explained for the intercorrelations of the four first-order factors. Only two variables had negative loadings, Opposites and Completing the Original Pair, both subtests of the Social Ability Scale. Table 13 shows the loadings of the thirteen variables on the second-order factor.

Regression Analysis

As stated earlier, the grade point average was used as an index to scholastic achievement. The correlation matrix of the variables included in the main study showed

that measures of the three types of intelligence had positive significant correlation with the GPA. To determine which of the measures of abstract, practical and social intelligence would give the best prediction of scholastic success a regression analysis using the stepwise procedure was performed. Table 14 contains the summarized results of the regression analysis.

The criterion variable, therefore, was the GPA and the predictors were the subtests of the APS, DAT and SAS. The F-ratio of the variance of the variable being entered ceased to be significant at Step 2 with *Verbal Reasoning* the entry. Four variables consistently gave negative weights: Spatial Relations, (DAT), Opposites (SAS), Completion (SAS) and Differences (SAS).

Canonical Correlation Analyses

Canonical correlation between sets of measures were obtained to know the degree of relationship between the complete sets of measures of the three types of abilities. Table 15 shows the correlation between each pair of new composites for each analysis, the chi-square of each new correlation and the significance of the chi-square values.

The correlations between the combined subtests of the DAT and SAS were significant for the first and second pair of new composites; the first correlation significant at both .05 and .01 levels while the second only at .05. Neither of the three canonical correlations between the SAS and APS measures (combined) was significant. The first canonical correlation between APS and DAT subtests was highly significant at both the .05 and .01 levels.

The combination of the subtests of the DAT and APS was correlated with the combined subtests of the SAS. The first canonical correlation was high and significant. The same results were obtained by correlating the APS subtests with the combination of the DAT and SAS subtests.

Discussion of the Results

Correlational Study

The very high and significant intercorrelations between the DAT and APS variables seem to indicate that the two tests are measuring, at varying degree, the same ability. Or if one assumes that each of the subtests

measures different abilities there is a strong indication that the underlying abilities are highly related. The Social Ability Scale is definitely tapping abilities different from those of the APS and DAT even though some of the SAS variables are positively correlated (significant) to APS and DAT subtests. The SAS abilities highly related to the DAT and APS variables are the ones measured by Recognition of Similarities and Completing Faces.

Scholastic achievement is strongly related to the abilities covered by Block Design, Cube Construction, Verbal Reasoning, Abstract Reasoning, and Recognition of Similarities. The abilities measured by Spatial Relations, Passalong and the rest of the SAS subtests seem not to have a significant contribution to an individual's successful performance at school. The correlations between the total scores and the GPA, however, indicate that abstract intelligence, practical ability and social intelligence make significant contributions to the scholastic success of an individual.

Analysis of Variance

It appears that there are sex differences in the

three types of intelligence. The results indicate and corroborate the popular belief that males are better than females in the practical aspect of things. The males performed significantly better in Passalong, Block Design and Cube Construction.

There is no significant difference between male and female subjects in one aspect of verbal ability, the ability measured by Verbal Reasoning. In abstractions and spatial visualizations or relations the males are significantly better than females. The males performed consistently better in Verbal Reasoning, Abstract Reasoning and Space Relations.

In social ability the result does not indicate any significant difference between the male and female subjects. However, in the validation study with a sample of 186, using only the scores on the five subtests included in the main study, the analysis of variance showed a highly significant effect of the sex category factor. Table 20 summarizes the results of the analysis. A possible explanation as why a significant effect of the sex category factor was found in the validation study and none in the main study might be the smallness of the sample used in the main study.

The slightly significant effect of the grade category factor seems to indicate that either age or the stage of schooling influences abstract intelligence.

Factor Analysis

The thirteen variables can be explained in terms of four dimensions.

Factor I is identified by the three DAT variables, and three APS variables:

Block Design	.83
Spatial Relations	.83
Cube Construction	.76
Abstract Relation	.76
Passalong	.69
Verbal Reasoning	.59

This dimension seems to refer to the ability or abilities common to both abstract intelligence and mechanical or practical ability. It was stated before that Spatial factor and Perceptual Speed, which are dimensions of abstract intelligence, were found to characterize mechanical ability tests. Furthermore, Wittenborn (1945) stated that one of the

types of abilities involved in mechanical ability tests is or can be labeled "mental". The APS subtests involve not only spatial visualization and perceptual speed but also a more complex psychomotor coordination. Block Design, which has the highest saturation in Factor I together with Spatial Relations, involves not only speed but also accuracy in following visual cues. It also involves mentally putting a block or blocks into the unfinished pattern and visualizing the end product while constantly referring to the visual cues. Space Relations suggests a more complex task since it involves spatial movement and rearrangement not only of parts but the whole and fit the presented pattern. Block Design provides blocks whereby actual verification of tentative moves is possible.

The first factor indicates, therefore, the overlap between abstract intelligence and practical ability. It would also explain the high relationship that exists between the two abilities.

Factor II seems to refer to the subjectively-evaluated ability of the individual with verbal facility playing an important and influential factor in the assessment process. The variables characterizing the

dimension are:

What Does the Person Say?	.90
Grade Point Average (GPA)	.59
Verbal Reasoning	.43

What Does the Person Say is an open-ended test of the Social Ability Scale the responses to which were evaluated independently by this writer and the thesis supervisor. The GPA is a measure of scholastic achievement consisting of the average of the marks on the courses. These marks represent not only the student's true achievement but also the teacher's subjective evaluation of the student. The significant loading of Verbal Reasoning seems to indicate that verbal ability of an individual influences the assessment of his or her abilities other than verbal. This would corroborate the observation that where non-objective method is used the person who is "good with words" most often and most likely will receive a favorable evaluation or will give a favorable impression.

Factor III, having only two variables with high positive loading, is quite difficult to identify. It seems to be a social ability factor characterized primarily by cognition and judgment. The third factor can be explained by the following variables:

Differences	.68
Recognition of Similarities	.57
Completing Faces	-.69

Judging from the high negative loading of Completing Faces, it appears that the ability involves a gestaltic approach used in dealing with social relationship problems, i.e., we have a tendency at certain times to evaluate the cues presented by the various parts of the face and body in their totality.

The fourth factor appears to be the memory dimension of social ability. Factor IV contains the following variables:

Completing the Original Pair	.95
Opposites	.39
What Does the Person Say?	.29
Completing Faces	-.41

In social relationship memory takes an important role - memory of faces, names, expressions, etc.

In a brief summary of the results of the first-order factor analysis we find that separate dimensions of abstract intelligence and practical ability were not shown. However, a factor explaining the relationship between the two

abilities was revealed. Social intelligence is represented by the third and fourth factor. A dimension that would explain the ability of an individual as evaluated by other people is represented by Factor II.

The hierarchical solution stopped at the second solution when only one factor explained the correlations between the four first-order factors. It was hypothesized that the second-order refers to the _general ability_ that would explain the inter-relationships of the abilities. The negative high loadings of two SAS variables, _Opposites_ and _Completing the Original Pair_ as shown on Table 12, is difficult to explain although one possible reason could be that the two tests may involve non-ability dimensions.

Regression Analysis

The variables that would give the best prediction of scholastic success are _Abstract Reasoning_ and _Verbal Reasoning_, both measures of abstract intelligence. These are the only variables that can be accepted into the regression equation based on the F-ratios.

Spatial Relations, Opposites, Completing Faces and Differences have negative weights. The beta weights of the last three are quite low which indicates that the three tests do not predict scholastic success at all. The high final beta weight of Spatial Relations , i.e. at Step no. 12, is negative and should not be taken as an indication that a negative contribution is given by the test on the prediction of success. The result can be considered an algarithmic artifact.

Of the SAS variables, What Does the Person Say has the highest final beta weight, the same value obtained by Block Design. The rest of the SAS variables have positive weights together with the APS variables, Passalong and Cube Construction.

If one disregards the decisions based on the F-values but would rather consider all the variables that would help in the prediction of scholastic success, the predictors and their beta weights would be:

Variables	Beta Weights
Abstract Reasoning	.34
Verbal Reasoning	.17
What Does the Person Say	.13
Block Design	.13
Recognition of Similarities	.11
Cube Construction	.08
Completing the Original Pair	.07
Passalong	.04

The results of the regression analysis show that the primary factor in scholastic success is a high amount of abstract intelligence. Social ability may predict success at school but not as well or as accurately as variables measuring abstract ability.

Canonical Correlation

There is a close relationship between abstract intelligence and social ability as indicated by the significance of the first and second canonical correlations (.43 and .34) respectively between the SAS and DAT variables. Social ability and practical ability or mechanical intelligence are positively related but not

significant. The first canonical correlation between the two sets of APS and SAS variables, .43 is high but fell a little short of the critical value. There is a definitely close relationship between practical ability and abstract intelligence. The first canonical correlation between the DAT and APS variables was very high, .75 and significant at both .05 and .01 levels.

In summary, a close relationship exists between abstract and practical intelligence. There is also a significant relationship between social intelligence and abstract intelligence. The results of the canonical correlation indicate that practical ability and social intelligence are positively related but not significant. The results, however, should be qualified by a statement on the reliability of the Social Ability Scale. High correlation coefficients are dependent on the reliabilities of the measures. The reliabilities of the subtests of the SAS are not as high as one would like them to be. As stated in Chapter V, the reliabilities can be increased if the number of items are increased. Therefore, it appears that if the test reliabilities can be increased the intercorrelations between the three types of abilities would increase, too.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Summary

The main objectives of the study were: (a) to gain a deeper understanding of the nature of social intelligence; and (b) to construct a valid and reliable pictorial test of social ability. In the study of the nature of social intelligence the following minor objectives were formulated: (a) to establish the abilities involved in social intelligence and their interrelationships; (b) to know how social intelligence is related to abstract intelligence and practical ability or mechanical intelligence; and (c) to discover the extent and nature of possible sex differences in social intelligence. The relationship between social intelligence and scholastic achievement was also looked into.

Thorndike's theory on the classifications of intelligence provided the theoretical framework to the study of the nature of social ability. Social itelligence was

studied in its relationship to the other types of intelligence - abstract and mechanical or practical. The behavioral matrix of Guilford's structure-of-intellect model served as the guide post in the formulation of the social intelligence test.

The test of social intelligence, which is called Social Ability Scale in this study, consisted of fifteen subtests. Three subtests were formulated for each of the five mental operations hypothesized in Guilford's model. The test battery, therefore, can be subdivided into:

Tests of Cognition (Social)

Tests of Memory (Social)

Tests of Divergent Production (Social)

Tests of Convergent Production (Social)

Tests of Judgment and Evaluation (Social)

All the tests were objective type tests except for the three tests of divergent production.

The materials used in the construcion of the scale were still photographs of affective expressions such as emotions, moods, feelings, thoughts, conditions, etc. The photographs were posed by high school students since it was expected that the portrayals of young models would be less

studied and artificial, hence, would be more spontaneous and real.

After a preliminary testing the test battery was reduced to eleven subtests. The Social Ability Scale was validated on a sample of 186 high school students. The K-R 20 coefficient of internal consistency was .54. The factor analysis of the eleven social ability variables plus five non-ability variables such as: sex, grade, parents' occupation, family size and sibling status revealed seven first-order factors, three second- order and a third-order factor. All the social ability variables had positive saturations on the third-order factor.

The main study was primarily on establishing the relationship between abstract, practical and social abilities. Three subtests of the Differential Aptitude Tests were chosen to measure absract intelligence. The Alexander Performance Scale was used to measure practical ability or mechanical intelligence. Six subtests of the Social Ability Scale were chosen after the validation study. The grade point average was the criterion of scholastic achievement. The following analyses were performed: (a) the Pearson r, (b) analyses of variance with repeated measures of the APS,

DAT and SAS data using sex and grade as classification variables, (c) factor analysis using the Hendrickson-White method with hierarchical solution, (d) regression analysis with GPA as the criterion variable and the various subtests of the APS, DAT and SAS as predictors and (e) canonical correlation analyses of the combined subtests.

The summary of the results of the main study will be discussed in the following paragraphs.

Findings

The tentative findings are discussed in connection with the questions raised on page 34.

1. Are there specific abilities that a person uses in social or personal relationship situations? Can these abilities be demonstrated through group tests constructed by using still photographs?

The answer to the first question is positive. The factor analysis of eleven social intelligence tests and five non-ability variables revealed seven first-order factors. Six of these factors were identified as dimensions of social intelligence which may be referred to as the specific

abilities involved in social intelligence. One factor, Factor VI, was considered a non-ability factor because it was characterized by the variable Sibling Status: having a high loading of .93. Factor I was identified as the Cognition factor hypothesized in Guilford's model; Test IV-B, Marching Face with Body, has the highest loading. Factor II was identified as Evaluation or Judgment factor while Factor III was labelled as a Memory factor. Factors IV, V and VII were not labelled since only one test characterized each of the three factors.

The results of the factor analysis plus the results of the item analysis indicated that the specific abilities of social intelligence can be demonstrated by means of group administered, nonverbal tests which had been constructed through the use of still photographs.

2. Is social intelligence an independent ability?

There seems to be an indication towards a positive answer. In the factor analysis of the eleven tests of social intelligence plus five non-ability variables, a third-order factor, orthogonally rotated, was obtained. All of the eleven tests of social intelligence loaded positively on the third-order factor; right loadings were significant. The

third-order factor was identified as the general social ability or social intelligence.

3. How are the three types of intelligence viz. abstract, practical and social interrelated?

There appears to be a strong relationship between abstract and mechanical intelligence. The Pearson correlation coefficient between the total scores on the Differential Aptitude Tests and the Alexander Performance Scale was very high and significant. Evidence provided by the results of the canonical correlation between the DAT and APS subtests showed clearly and unequivocably the close relationship between the two types of abilities.

As indicated by the correlations, both the Pearson r and the canonical correlation, there exist a significant relationship between abstract and social intelligence. Given a more reliable test of social intelligence the relationship might prove to be higher than is evident from this study.

There is a positive relationship between practical or mechanical intelligence and social intelligence although not significant. The Pearson r and the canonical correlation were high but were a little bit less than the critical

values at .05 level of significance.

4. Are there sex differences in social intelligence? in abstract intelligence? in practical intelligence?

If the answer is based on the results of the analysis of variance of SAS data from the main study it is negative. There are no sex differences in social intelligence as indicated from the analysis of variance of the data from the analysis of the main study data. However, the analysis of variance of the data from the five SAS subtests selected to be included in the main study test battery, using the larger sample of the validation study ($N = 186$ compared to $N = 99$ of the main study), showed a very high F-ratio ($p = .00052$) of the main effect of the sex category.

The question, therefore, can not be categorically answered positively or negatively. There is evidence that if the sample is large and the unreliability of the SAS subtests reduced an indication of sex differences in social intelligence is apparent. The results of the validation study show that female subjects scored consistently higher than males in all subtests. The females are significantly better at recognizing similar expressions and labelling of

facial expressions.

There are significant differences in abstract intelligence between males and females with males having an "edge" over the females. The analysis of variance of the DAT data showed a very significant F-ratio of the effect of sex category ($p = .000015$). There was no significant difference in the performance of male and female subjects in _Verbal Reasoning_. In _Abstract Reasoning_ and _Space Relations_, the males performed significantly better than females (the difference between the two pairs of means were significant at both .01 and .05 levels).

There are sex differences in mechanical intelligence as measured by the APS. The males appear to be better than females in the manipulation with concrete things, in dealing with things and objects by hand. The analysis of variance of the APS gave a very significant F-ratio of the effect of sex category ($p = .000077$). The males were significantly better at doing the _Passalong_, the _Block Design_ and _Cube Construction_.

5. What is the relationship between social intelligence and scholastic achievement as measured by the grade point average (GPA) as given by teacher's grades?

The Pearson r between the GPA and the total scores of the SAS indicate a significant relationship between the two variables. There is an indication that high social intelligence will help a student perform better at school. There is a high correlation between GPA and Recognition of Similarities.

The correlation matrix also shows evidence of highly significant relationship between scholastic achievement and abstract intelligence; between scholastic achievement and mechanical or practical intelligence. Consequently one can conclude that since significant interrelationships are evident between scholastic achievement and abstract, social and practical abilities the three types of intelligence influence the performance of a student.

However, the results of the regression analysis indicate that the best predictors of scholastic success are measures of abstract intelligence. Verbal Reasoning and Abstract Reasoning gave the only beta weights that were significant and, therefore, can be included in the regression equation.

The findings of the present study have answered, to a certain degree, the questions raised regarding social intelligence. However, the answers are still inadequate to provide a full understanding of the subject. Therefore, further research on social intelligence, especially its measurement, is still needed.

Table 1

THE TEST BATTERY

Code	Description	No. of Items	Scoring
Test I-A	Recognition of Similarities (Face vs. Face)	10	Right
Test I-B	Recognition of Similarities (Face vs. Body)	10	Right
Test I-C	Differences	10	Right
Test II-A	Pairing Expressional Names with Faces	12	Right
Test II-B	Picking Out Familiar Faces from a Group	10	Right
Test II-C	Completing the Original Pair	10	Right
Test III-A	Grouping Pictures to Show a Common Expression	5	Variable
Test III-B	Grouping Pictures to Show a Continuing Expression	5	Variable
Test III-C	What Does the Person Say?	5	Variable
Test IV-A	Expression Naming	12	Right
Test IV-B	Matching Face with Body	10	Right
Test IV-C	Completing Faces	10	Right
Test V-A	Finding the Exact Picture	10	Right
Test V-B	Opposites	10	Right
Test V-C	Matching Expressional Names with Body Pictures	15	Right

Table 2

THE TEST SCHEDULE

Session I	
Study Page of Test II-A (Memory Test)	2 minutes
Test I-A Recognition of Similarities (Face vs. Face)	3 "
Test I-B Recognition of Similarities (Face vs. Body)	3 "
Test I-C Differences	3 "
Test II-A Pairing Expressional Names with Faces	4 " (3 minutes in actual validation test)
Study Page of Test II-B (Memory Test)	3 "
Test V-A Finding the Exact Picture	2 "
Test V-B Opposites	3 "
Test V-C Matching Expressional Names with Body Pictures	4 "
Test II-C Picking Out Familiar Faces from a Group	3 "
Total	30 minutes
BREAK	
Session II	
Study Page of Test II-C (Memory Test)	2 minutes
Test IV-A Picture Naming	3 "
Test IV-B Matching Face with Body	3 "
Test IV-C Completing Faces	3 "
Test II-C Completing the Original Pair	2 "
Test III-A Grouping Pictures to Show a Common Expression	3 "
Test III-B Grouping Pictures to Show a Continuing Expression	10 "
Test III-C What Does the Person Say?	10 "
Total	36 minutes

Table 3

THE CORRELATION MATRIX - VALIDATION STUDY

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Test I-A Recognition of Similarities I (Face vs. Face)	1.00															
2. Test I-B Recognition of Similarities II (Face vs. Body)	.16	1.00														
3. Test I-C Differences	.11	.14	1.00													
4. Test II-A Pairing Expressional Names with Faces	.12	.13	.14	1.00												
5. Test V-A Finding the Exact Picture	.13	.07	.14	.17	1.00											
6. Test V-B Opposites	.07	.07	-.01	.15	.14	1.00										
7. Test V-C Matching Expressional Names with Body Pictures	.12	.04	.11	.08	-.01	-.04	1.00									
8. Test II-C Completing the Original Pair	.04	-.11	-.05	.11	.09	.02	-.01	1.00								
9. Test IV-A Expression Naming	.14	.10	.19	.13	.26	.03	.14	-.07	1.00							
10. Test IV-B Matching Face with Body	.14	.14	.02	.09	-.04	.02	-.02	.11	.06	1.00						
11. Test IV-C Completing Faces	.10	-.02	.06	.15	.08	.12	.08	.04	.14	.05	1.00					
12. Sex (M or F)	-.20	-.06	-.03	-.19	-.06	-.18	.03	-.06	-.12	-.19	-.15	1.00				
13. Grade	.11	.10	.13	-.06	.05	.03	-.04	-.13	.01	-.03	.03	.05	1.00			
14. Patents' Occupation	.03	-.04	-.06	.07	.08	.08	.05	.16	.07	.00	.07	-.00	-.12	1.00		
15. Family Size	.10	-.05	.15	-.02	-.05	-.13	-.20	.08	.01	.14	.01	-.06	-.02	-.13	1.00	
16. Sibling Status	-.10	.03	.07	-.04	-.09	-.05	.14	.08	-.01	-.09	-.03	.02	.00	.06	-.02	1.00

Table 4

UNROTATED PRINCIPAL AXES FACTOR MATRIX

VALIDATION STUDY

Variables		I	II	III	IV	V	VI	VII	h^2
1. Test I-A	Recognition of Similarities I (Face vs. Face)	.53	.17	-.13	.03	-.14	-.18	.05	.38
2. Test I-B	Recognition of Similarities II (Face vs. Body)	.36	.35	.13	-.08	-.44	.20	.41	.67
3. Test I-C	Differences	.38	.44	.14	.35	.26	.21	-.00	.59
4. Test II-A	Pairing Expressional Names with Faces	.55	-.20	.01	.03	-.04	.15	.05	.36
5. Test V-A	Finding the Exact Picture	.47	-.07	.18	-.21	.54	.05	.31	.69
6. Test V-B	Opposites	.35	-.24	.06	-.53	-.10	.36	-.15	.63
7. Test V-C	Matching Expressional Names with Body Pictures	.19	-.06	.54	.39	-.13	-.31	-.13	.70
8. Test II-C	Completing the Original Pair	.11	-.53	-.29	.33	.15	.29	.15	.61
9. Test IV-A	Expression Naming	.52	.11	.23	.14	.27	-.35	.07	.56
10. Test IV-B	Matching Face with Body	.32	.02	-.50	.13	-.39	-.14	.19	.58
11. Test IV-C	Completing Faces	.40	-.15	.02	.01	.09	-.11	-.68	.67
12. Sex		-.49	.13	.33	.07	.25	-.07	.26	.50
13. Grade		.08	.53	.15	-.25	.06	.32	-.18	.51
14. Parents' Occupation		.15	-.57	.20	.07	.08	-.00	.22	.44
15. Family Size		.05	.29	-.63	.35	.30	.06	-.07	.71
16. Sibling Status		-.10	-.06	.31	.54	-.16	.54	-.12	.74
		2.06	1.47	1.43	1.23	1.12	1.01	1.00	9.33
	Per Cent of Common Variance	22.07	15.74	15.32	13.23	12.05	10.86	10.74	100.00
	Per Cent of Total Variance	12.87	9.18	8.94	7.71	7.03	6.34	6.26	58.32

Table 5

PRIMARY FACTOR PATTERN MATRIX - FIRST SOLUTION

VALIDATION STUDY

Variables			I	II	III	IV	V	VI	VII
1.	Test I-A	Recognition of Similarities I (Face vs. Face)	.50	.20	-.08	-.02	.07	-.17	.04
2.	Test I-B	Recognition of Similarities II (Face vs. Body)	.49	.05	-.22	.16	.16	.13	-.53
3.	Test I-C	Differences	-.06	.49	-.21	-.18	-.09	.36	.01
4.	Test II-A	Pairing Expressional Names with Faces	.27	.26	.22	.27	.05	.11	.07
5.	Test V-A	Finding the Exact Picture	-.24	.89	.14	.19	-.17	-.21	-.10
6.	Test V-B	Opposites	.03	-.00	-.08	.81	-.06	-.01	.17
7.	Test V-C	Matching Expressional Names with Body Pictures	.05	-.01	.05	-.23	.80	.25	.17
8.	Test II-C	Completing the Original Pair	.12	.06	.71	.03	-.27	.31	.03
9.	Test IV-A	Expression Naming	.02	.67	.01	-.21	.23	-.19	.14
10.	Test IV-B	Matching Face with Body	.86	-.21	.18	-.12	-.08	-.16	-.16
11.	Test IV-C	Completing Faces	-.03	.01	-.11	.24	.14	.01	.83
12.	Sex		-.55	.17	-.03	-.32	.06	.02	-.32
13.	Grade		-.20	.07	-.65	.27	-.15	.14	.03
14.	Parents' Occupation		-.08	.24	.59	.11	.20	.06	-.06
15.	Family Size		.24	.07	.02	-.40	-.62	.03	.09
16.	Sibling Status		-.20	-.24	.13	-.00	.20	.93	-.02

Table 6

PRIMARY FACTOR PATTERN MATRIX - SECOND SOLUTION

VALIDATION STUDY

Variables	I	II	III
1. Test I-A Recognition of Similarities I (Face vs. Face)	.36	.04	.29
2. Test I-B Recognition of Similarities II (Face vs. Body)	-.17	.45	.58
3. Test I-C Differences	.29	-.24	.63
4. Test II-A Pairing Expressional Names with Faces	.47	.20	.08
5. Test V-A Finding the Exact Picture	.24	.28	.09
6. Test V-B Opposites	.19	.45	-.11
7. Test V-C Matching Expressional Names with Body Pictures	.07	.25	.18
8. Test II-C Completing the Original Pair	.46	-.18	-.33
9. Test IV-A Expression Naming	.35	.08	.25
10. Test IV-B Matching Face with Body	.30	-.10	.09
11. Test IV-C Completing Faces	.65	-.20	-.10
12. Sex	-.57	.05	-.00
13. Grade	-.16	.01	.49
14. Parents' Occupation	.17	.34	-.36
15. Family Size	.40	-.81	.17
16. Sibling Status	.04	-.09	.23

Table 7

THE THIRD FACTOR SOLUTION SHOWING THE PATTERN

OF GENERAL SOCIAL ABILITY FACTOR

Name	Description	Factor Loading
1. Test I-A	Recognition of Similarities I (Face vs. Face)	.41
2. Test I-B	Recognition of Similarities II (Face vs. Body)	.40
3. Test I-C	Differences	.22
4. Test II-A	Pairing Expressional Names with Faces	.56
5. Test V-A	Finding the Exact Picture	.45
6. Test V-B	Opposites	.48
7. Test V-C	Matching Expressional Names with Faces	.31
8. Test II-C	Completing the Original Pair	.13
9. Test IV-A	Expression Naming	.42
10. Test IV-B	Matching Face with Body	.20
11. Test IV-C	Completing Faces	.34

Table 8

SUMMARIZED RESULTS OF THE VALIDATION STUDY

	Variables	Description	No. of Items	Means	S. D.	Reliability (K-R 20)	Reliability if Test Lengthened 5 Times	Range of Item Difficulty Level	Significant Positive Factor Loadings ($\leq .30$)
1.	Test I-A	Recognition of Similarities I (Face vs. Face)	10	5.30	2.09	.48	.83	.32-.73	I .50
2.	Test I-B	Recognition of Similarities II (Face vs. Body)	10	4.73	1.64	.28	.66	.13-.81	I .49
3.	Test I-C	Differences	10	6.33	1.62	.38	.75	.17-.91	II .49; VI .36
4.	Test II-A	Pairing Expressional Names with Faces	12	8.61	2.71	.69	.92	.47-.86	I .45
5.	Test V-A	Finding the Exact Picture	10	8.54	.83	.53	.85	.84-1.00	II .89
6.	Test V-B	Opposites	10	4.03	1.50	.37	.75	.07-.70	IV .81
7.	Test V-C	Matching Expressional Names with Body Pictures	15	6.45	1.73	.12	.43	.05-.81	V .80
8.	Test II-C	Completing the Original Pair	10	1.69	1.71	.28	.66	.07-.27	III .71; VI .31
9.	Test IV-A	Expression Naming	12	4.09	1.88	.37	.75	.04-.63	II .67
10.	Test IV-B	Matching Face with Body	10	2.07	1.28	.12	.43	.03-.53	I .86
11.	Test IV-C	Completing Faces	10	2.77	1.40	.08	.30	.13-.94	VII .83
12.	S	Sex		1.53	.50				
13.	G	Grade		2.06	.84				
14.	PO	Parents' Occupation		3.34	1.03				
15.	FS	Family Size		1.69	.50				
16.	SS	Sibling Status		1.97	.73				

Table 9

THE TEST BATTERY

MAIN STUDY

	Title	Source	No. of Items	Time Limit	Scoring
1. PA	Passalong	APS	9	Variable	Time
2. BD	Block Design	APS	10	Variable	Time
3. CC	Cube Construction	APS	3	Variable	Time & Right
4. VR	Verbal Reasoning	DAT	25	15 Min.	Right
5. AR	Abstract Reasoning	DAT	25	15 Min.	Right
6. SR	Spatial Relations	DAT	30	12 Min.	Right
7. RS	Recognition of Similarities	SAS	10	3 Min.	Right
8. D	Differences	SAS	10	3 Min.	Right
9. O	Opposites	SAS	10	3 Min.	Right
10. M	Completing the Original Pair	SAS	10	8 Min.	Right
11. CF	Completing Faces	SAS	10	5 Min.	Right
12. PI	What Does the Person Say?	SAS	5	15 Min.	Right

Table 10

THE CORRELATION MATRIX OF THE VARIABLES

IN THE MAIN STUDY

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Sex	1.00																				
2. Grade	.25	1.00																			
3. Parents' Occupation	-.05	-.09	1.00																		
4. Family Size	.20	-.05	-.05	1.00																	
5. Sibling Status	.08	.27	.00	-.19	1.00																
6. Grade Point Average	-.10	.07	.00	-.03	-.02	1.00															
7. Passalong	.28	-.02	-.02	-.07	.10	.19	1.00														
8. Block Design	.38	.15	.09	-.01	.18	.28	.45	1.00													
9. Cube Construction	.29	.25	-.00	-.08	.08	.24	.42	.69	1.00												
10. Total APS Score	.39	.13	.03	-.04	.18	.28	.77	.87	.74	1.00											
11. Verbal Reasoning	.25	.27	-.12	-.06	.11	.36	.33	.50	.45	.50	1.00										
12. Abstract Reasoning	.40	.13	-.12	.13	.17	.36	.42	.53	.44	.57	.49	1.00									
13. Spatial Relations	.39	.20	-.04	.03	.13	.14	.52	.64	.56	.68	.47	.56	1.00								
14. Total DAT Score	.40	.24	-.08	.07	.12	.35	.52	.68	.59	.71	.75	.79	.84	1.00							
15. Recognition of Similarities	.09	.05	-.17	-.03	.05	.22	.31	.17	.17	.29	.29	.21	.23	.27	1.00						
16. Differences	.16	.02	-.13	.08	-.03	.05	.05	.05	.05	.03	-.04	.14	.04	.05	.15	1.00					
17. Opposites	-.15	-.29	.03	-.03	-.11	-.14	-.18	-.20	-.19	-.23	-.16	-.03	-.25	-.18	-.16	-.08	1.00				
18. Completing the Original Pair	-.07	-.09	.02	-.16	-.04	.03	-.00	-.02	-.10	-.03	-.05	.00	.11	.01	-.06	-.01	.09	1.00			
19. Completing Faces	.07	.01	.05	.18	-.11	.03	.21	.07	.09	.14	.09	.21	.07	.14	-.14	-.08	-.02	-.14	1.00		
20. What Does the Person Say?	-.14	.26	.10	-.04	.19	.17	-.03	.01	.07	-.01	.22	-.00	.08	.13	.05	.02	-.10	.17	-.06	1.00	
21. Total SAS Score	-.04	-.01	-.05	-.01	-.01	.23	.21	.08	.08	.14	.21	.28	.15	.23	.40	.37	.30	.38	.32	.34	1.00

Table 11

THE UNROTATED PRINCIPAL AXES FACTOR MATRIX

MAIN STUDY

Variables	I	II	III	IV	h^2
1. Grade Point Average	.46	.31	.04	-.39	.47
2. Passalong	.67	-.17	-.07	.13	.50
3. Block Design	.81	-.11	.06	.15	.70
4. Cube Construction	.76	-.15	-.00	.09	.60
5. Verbal Reasoning	.71	.12	.14	-.26	.61
6. Abstract Reasoning	.74	-.12	.10	.10	.59
7. Spatial Relations	.80	-.03	.13	.26	.72
8. Recognition of Similarities	.40	.36	-.48	-.01	.52
9. Differences	.11	.28	-.52	.32	.46
10. Opposites	-.32	-.17	.35	.31	.35
11. Completing the Original Pair	-.03	.44	.58	.48	.75
12. Completing Faces	.17	-.61	.20	-.37	.58
13. What Does the Person Say?	.12	.62	.36	-.39	.68
	3.90	1.37	1.19	1.07	7.53
Percentage of Common Variance	51.84	18.25	15.76	14.15	100.00
Percentage of Total Variance	30.00	10.57	9.12	8.19	57.88

Table 12

THE FIRST PRIMARY FACTOR PATTERN

MAIN STUDY

Variables	I	II	III	IV
1. Grade Point Average	.12	.59	-.00	-.09
2. Passalong	.72	-.15	.05	-.05
3. Block Design	.88	-.04	.00	.09
4. Cube Construction	.79	-.06	-.01	-.03
5. Verbal Reasoning	.51	.43	-.11	-.03
6. Abstract Reasoning	.80	-.01	-.05	.07
7. Space Relations	.91	-.04	.06	.24
8. Recognition of Similarities	.13	.12	.57	-.19
9. Differences	.07	-.23	.68	-.03
10. Opposites	.03	-.25	-.22	.39
11. Completing the Original Pair	.25	.21	.08	.95
12. Completing Faces	.18	-.06	.67	-.41
13. What Does the Person Say?	-.21	.90	-.06	.29

Table 13

THE SECOND - ORDER FACTOR MATRIX

MAIN STUDY

Variables		I
1.	Grade Point Average	.58
2.	Passalong	.50
3.	Block Design	.58
4.	Cube Construction	.57
5.	Verbal Reasoning	.67
6.	Abstract Reasoning	.53
7.	Space Relations	.53
8.	Recognition of Similarities	.59
9.	Differences	.22
10.	Opposites	-.54
11.	Completing the Original Pair	-.29
12.	Completing Faces	.06
13.	What Does the Person Say?	.25

Table 14

RESULTS OF THE REGRESSION ANALYSIS

Step	Variable Entering	F-Ratio	P	Decision	Beta Weight of Each Variable											
					1	2	3	4	5	6	7	8	9	10	11	12
1	Abstract Reasoning	14.28	.00027	ACCEPT					.37							
2	Verbal Reasoning	4.91	.029	ACCEPT				.24	.25							
3	Spatial Relation	1.96	.16	REJECT				.29	.32	-.17						
4	Opposite	2.214	.14	REJECT				.27	.35	-.21			-.15			
5	Picture Interpretation	1.80	.18	REJECT				.23	.37	-.21			-.14			.13
6	Block Design	1.56	.21	REJECT		.16		.20	.34	-.28			-.13			.14
7	Recognition of Similarities	1.43	.23	REJECT		.17		.17	.33	-.29	.12		-.12			.14
8	Completing the Original	.52	.47	REJECT		.17		.18	.33	-.31	.12		-.13	.07		.13
9	Cube Construction	.36	.55	REJECT		.13	.09	.17	.33	-.33	.12		-.13	.08		.13
10	Passalong	.09	.76	REJECT	.03	.13	.08	.17	.33	-.34	.11		-.13	.08		.13
11	Completing Faces	.04	.85	REJECT	.04	.13	.08	.18	.33	-.34	.11		-.12	.07	-.02	.13
12	Differences	.02	.87	REJECT	.04	.13	.08	.17	.34	-.34	.11	-.02	-.13	.07	-.02	.13

Table 15

RESULTS OF THE CANONICAL CORRELATION ANALYSES

MAIN STUDY

	Correlations	χ^2	.05	.01
I. Social vs. Abstract	.43	37.83	*	*
(SAS) (DAT)	.34	18.98	*	
	.28	7.45		
II. Social vs. Practical	.43	22.35		
(SAS) (APS)	.16	3.25		
	.09	.80		
III. Practical vs. Abstract	.75	80.19	*	*
(SAS) (DAT)	.10	1.20		
	.00	.16		
IV. Practical + Abstract	.48	51.53	*	*
vs. Social	.38	27.14		
	.29	12.65		
	.20	4.71		
	.10	.96		
	.02	.02		
V. Abstract + Social	.76	91.96	*	*
vs. Practical	.32	11.38		

Table 16

SUMMARY OF RATINGS OF PHOTOGRAPHS

Faces

Expressions	Number of Photographs Rated: Excellent (1)	Very Good (2)	Good (3)	Poor (4)	Invalid (5)
1. No Expression	0	1	8	5	2
2. Smiling Expression	8	2	5	1	0
3. Ambition	0	0	4	9	3
4. Despair	0	4	7	1	4
5. Determination	1	2	6	3	4
6. Anger	0	2	5	3	6
7. Disappointment	4	5	5	1	1
8. Approbation	0	5	3	4	4
9. Indecision	6	1	8	1	0
10. Love	1	2	6	6	1
11. Hate	1	2	3	2	8
12. Scorn	1	1	8	3	3
13. Suspicion	7	2	4	2	0
14. Disgust	0	3	3	2	7
15. Regret	0	2	8	2	4
16. Jealousy	0	0	4	5	7
17. Admiration	1	3	10	1	1
18. Sadness	3	4	8	0	1
19. Envy	1	0	7	6	2
20. Fear	1	2	5	5	3
21. Joy, Happiness	11	1	2	1	1
22. Contentment, Satisfaction	3	3	7	0	3
23. Fatigue	1	2	6	4	3
24. Surprise	2	3	7	3	1
25. Confusion	4	2	6	1	3
26. Dismay	0	1	6	3	6
27. Shock	7	4	1	2	1
28. Pity	0	1	7	2	5
29. Disbelief	1	3	6	1	4
30. Sudden Recognition or Recall of Something or Someone	2	5	4	2	3

Table 17

SUMMARY OF RATINGS OF PHOTOGRAPHS

Body

	Number of Photographs Rated:				
Expressions	Excellent 1	Very Good 2	Good 3	Poor 4	Invalid 5
1. No Expression	0	2	8	5	1
2. Smiling Expression	0	4	8	2	2
3. Ambition	0	0	5	10	1
4. Despair	0	5	4	5	2
5. Determination	0	4	7	4	1
6. Anger	1	0	9	3	3
7. Disappointment	2	5	5	2	2
8. Approbation	1	2	4	6	2
9. Indecision	5	4	3	4	0
10. Love	2	0	4	5	5
11. Hate	0	1	2	6	7
12. Scorn	0	1	8	6	1
13. Suspicion	1	3	10	0	2
14. Disgust	0	0	6	3	7
15. Regret	0	2	6	6	2
16. Jealousy	0	0	4	3	9
17. Admiration	0	2	9	4	1
18. Sadness	3	2	6	4	1
19. Envy	0	2	4	4	6
20. Fear	2	4	4	4	2
21. Joy, Happiness	8	1	4	2	1
22. Contentment, Satisfaction	4	3	1	3	5
23. Fatigue	0	3	5	7	1
24. Surprise	1	1	9	2	3
25. Confusion	5	2	5	1	3
26. Dismay	0	0	2	5	9
27. Shock	3	2	5	3	1
28. Pity	0	0	8	2	6
29. Disbelief	3	0	4	3	5
30. Sudden Recognition or Recall of Something or Someone	1	4	6	0	3

Table 18

RESULTS OF THE ANALYSIS OF VARIANCE - SEX AS INDEPENDENT VARIABLE

VALIDATION STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	29014.00	185			
Main Effect A (Sex Category)	2203.45	1	2203.45	15.12	.00015
Subjects within Groups	26809.00	184	145.70		
Within Subjects	150471.00	1860			
Main Effect B (SAS)	119.17	10	11.92	.15	.9988
A x B Interaction Effect	1013.52	10	101.35	1.25	.2547
B x Subjects within Groups	149367.00	1840	81.18		

Table 19

RESULTS OF THE ANALYSIS OF VARIANCE - GRADE AS INDEPENDENT VARIABLE

VALIDATION STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	28985.00	185			
Main Effect A (Grade)	114.05	2	57.02	.362	.6971
Subject within Groups	28859.00	183	157.70		
Within Subjects	150476.00	1860			
Main Effect B (SAS)	148.26	10	14.83	.18	.9971
A x B Interaction Effect	1900.75	20	95.04	1.17	.2696
B x Subject within Groups	148433.00	1830	81.11		

Table 20

ANALYSIS OF VARIANCE USING THE

SCORES ON THE FIVE SUBTESTS SELECTED

FOR THE MAIN STUDY

N = 186

Source of Variation	SS	DF	MS	F	P
Between Subjects	20108.00	185			
Main Effect A (Sex)	1277.23	1	1277.23	12.48	.00052
Subject within Groups	18831.00	184	102.34		
Within Subjects	63418.00	744			
Main Effect B (SAS)	19.56	4	4.89	.06	.9939
A x B Interaction Effect	399.54	4	99.89	1.17	.324
B x Subject within Groups	63002.00	736	85.60		

Cell Means:	RS*	D	O	CP	CF
F	52.14	50.26	51.76	50.92	51.67
M	48.17	49.73	48.40	49.81	48.90

* Difference between means significant at .05 level

Table 21

VARIMAX ROTATED FACTOR MATRIX - FIRST SOLUTION

VALIDATION STUDY

Variables	I	II	III	IV	V	VI	VII	h^2
1. Test I-A Recognition of Similarities I (Face vs. Face)	.52	.29	-.10	.01	.08	-.08	-.06	.38
2. Test I-B Recognition of Similarities II (Face vs. Body)	.44	.15	-.26	.22	.20	.16	-.53	.67
3. Test I-C Differences	.10	.53	-.28	-.14	.10	.44	.03	.59
4. Test II-A Pairing Expressional Names with Faces	.33	.30	.20	.31	.04	.15	.08	.36
5. Test V-A Finding the Exact Picture	-.10	.73	.14	.28	-.13	-.13	-.08	.69
6. Test V-B Opposites	.08	.02	-.02	.78	-.03	-.04	.11	.63
7. Test V-C Matching Expressional Names with Body Pictures	.10	.11	.06	-.19	.75	.23	.15	.70
8. Test II-C Completing the Original Pair	.10	.01	.64	.07	-.33	.28	.05	.61
9. Test IV-A Expression Naming	.15	.66	.01	-.14	.24	-.09	.15	.56
10. Test IV-B Matching Face with Body	.72	-.10	.12	-.10	-.09	-.09	-.10	.58
11. Test IV-C Completing Faces	.13	.12	-.05	.18	.10	.04	.77	.67
12. Sex	-.56	.03	-.04	-.29	.08	-.02	-.32	.50
13. Grade	-.09	.13	-.63	.22	-.10	.16	-.03	.51
14. Parents' Occupation	-.08	.16	.59	.19	.18	.02	-.03	.44
15. Family Size	.25	.09	-.08	-.42	-.64	.12	.16	.71
16. Sibling Status	-.13	-.13	.08	-.01	.13	.83	-.02	.74
	1.58	1.55	1.40	1.30	1.29	1.14	1.09	9.33
Percent of Common Variance	16.88	16.57	14.96	13.90	13.82	12.22	11.65	100.00
Percent of Total Variance	9.85	9.66	8.73	8.11	8.06	7.12	6.80	58.32

Table 22

VARIMAX ROTATED FACTOR MATRIX - SECOND SOLUTION

VALIDATION STUDY

Variables			I	II	III	h^2
1.	Test I-A	Recognition of Similarities I (Face vs. Face)	.38	.20	.25	.25
2.	Test I-B	Recognition of Similarities II (Face vs. Body)	-.07	.49	.53	.53
3.	Test I-C	Differences	.34	-.05	.61	.49
4.	Test II-A	Pairing Expressional Names with Faces	.46	.36	.02	.34
5.	Test V-A	Finding the Exact Picture	.25	.37	.03	.20
6.	Test V-B	Opposites	.19	.49	-.17	.30
7.	Test V-C	Matching Expressional Names with Body Pictures	.10	.30	.15	.12
8.	Test II-C	Completing the Original Pair	.38	-.08	-.34	.27
9.	Test IV-A	Expression Naming	.37	.23	.21	.23
10.	Test IV-B	Matching Face with Body	.29	.02	.07	.09
11.	Test IV-C	Completing Faces	.59	.00	-.13	.37
12.	Sex		-.53	-.14	.04	.30
13.	Grade		-.09	.04	.50	.25
14.	Parents' Occupation		.14	.34	-.40	.29
15.	Family Size		.36	-.65	.22	.60
16.	Sibling Status		.06	-.04	.24	.06
			1.73	1.50	1.46	4.69
		Per Cent of Common Variance	36.90	31.90	31.20	100.00
		Per Cent of Total Variance	10.82	9.35	9.14	29.31

Table 23

ANALYSIS OF VARIANCE OF THE ALEXANDER PERFORMANCE SCALE

DATA - SEX AS CLASSIFICATION VARIABLE

MAIN STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	18252.75	98			
Main Effect A (Sex)	2742.33	1	2742.33	17.15	.000077
Subjects within Groups	15511.38	97	159.91		
Within Subjects	8971.19	198			
Main Effect B (APS)	6.96	2	3.48	.08	.9254
A x B Interaction	72.89	2	36.45	.81	.4456
B x Subjects within Groups	8710.69	194	44.90		

Cell Means:

	PA * **	BD * **	CC * **
F	47.31	46.29	47.08
M	52.75	53.77	52.38

* Difference between means significant at .05 level

** Difference between means significant at .01 level

Table 24

ANALYSIS OF VARIANCE OF THE DIFFERENTIAL APTITUDE

TESTS DATA - SEX AS CLASSIFICATION VARIABLE

MAIN STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	18082.88	98			
Main Effect A (Sex)	3225.10	1	3225.10	21.05	.000015
Subjects within Groups	14859.00	97	153.19		
Within Subjects	8812.25	198			
Main Effect B (DAT)	1.55	2	.77	.02	.9829
A x B Interaction	130.12	2	65.06	1.45	.2361
B x Subjects within Groups	8679.25	194	44.74		

Cell Means:

	VR	AR * **	SR * **
F	47.67	46.19	46.29
M	52.38	53.70	53.84

* Difference between means significant at .05 level

** Difference between means significant at .01 level

Table 25

ANALYSIS OF VARIANCE OF THE SOCIAL ABILITY SCALE

DATA - SEX AS CLASSIFICATION VARIABLE

MAIN STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	8229.00	98			
Main Effect A (Sex)	2.51	1	2.51	.03	.8637
Subjects within Groups	8226.00	97	84.80		
Within Subjects	48563.00	495			
Main Effect B (SAS)	33.64	5	6.73		.9968
A x B Interaction	793.85	5	158.77		.1550
B x Subjects within Groups	47737.00	485	98.43		

Cell Means:

	RS	D	O	CP	CF	PI
F	49.16	48.36	51.57	50.49	49.81	51.37
M	50.81	51.46	48.70	49.13	51.25	48.58

Table 26

ANALYSIS OF VARIANCE OF THE ALEXANDER PERFORMANCE

SCALE DATA - GRADE AS CLASSIFICATION VARIABLE

MAIN STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	18251.94	98			
Main Effect A (Grade)	611.41	2	305.70	1.67	.1941
Subjects within Groups	17596.88	96	183.30		
Within Subjects	8793.06	198			
Main Effect B (APS)	4.99	2	2.50	.06	.9449
A x B Interaction	299.62	4	74.90	1.70	.1509
B x Subjects within Groups	8444.69	192	43.98		

Cell Means:

	PA	BD	CC
Grade XII	50.55	51.96	52.48
Grade XI	47.43	48.69	48.49
Grade X	51.03	48.65	47.38

Table 27

ANALYSIS OF VARIANCE OF THE DIFFERENTIAL APTITUDE TESTS

DATA - GRADE AS INDEPENDENT VARIABLE

MAIN STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	18081.50	98			
Main Effect A (Grade)	1358.44	2	679.22	3.94	.0228
Subjects within Groups	16571.19	96	172.62		
Within Subjects	8815.06	198			
Main Effect B (DAT)	.73	2	.37	.01	.9920
A x B Interaction	96.91	4	24.23	.53	.7105
B x Subjects within Groups	8703.13	192	45.33		

CELL Means:

	VR	AR	SR
Grade XII	53.46	51.81	52.75
Grade XI	48.15	47.95	47.19
Grade X	47.46	49.04	48.60

Table 28

ANALYSIS OF VARIANCE OF SOCIAL ABILITY SCALE DATA - GRADE

AS CLASSIFICATION VARIABLE

MAIN STUDY

Source of Variation	SS	DF	MS	F	P
Between Subjects	8229.00	98			
Main Effect A (Grade)	36.04	2	18.02	.21	.8102
Subjects within Groups	8198.00	96	85.40		
Within Subjects	48568.00	495			
Main Effect B (SAS)	1.95	5	.39	.004	.9999
A x B Interaction	2177.66	10	217.77	2.26	.0138
B x Subjects within Groups	46244.00	480	96.34		

Table 29

VARIMAX ROTATED FACTORS - FIRST SOLUTION

MAIN STUDY

	I	II	III	IV	h^2
1. Grade Point Average	.27	.61	.05	-.13	.47
2. Passalong	.69	-.00	.08	-.12	.50
3. Block Design	.83	.10	.04	-.01	.70
4. Cube Construction	.76	.08	.04	-.11	.60
5. Verbal Reasoning	.59	.51	-.04	-.10	.61
6. Abstract Reasoning	.76	.11	-.01	-.02	.59
7. Space Relations	.83	.09	.09	.13	.72
8. Recognition of Similarities	.24	.25	.59	-.22	.52
9. Differences	.07	-.12	.66	-.15	.46
10. Opposites	-.14	-.33	-.27	.39	.35
11. Completing the Original Pair	.05	.10	.03	.86	.75
12. Completing Faces	.22	-.05	-.62	-.37	.58
13. What Does the Person Say?	-.10	.78	-.03	.26	.68
	3.56	1.47	1.27	1.22	7.53
Percentage of Common Variance	47.31	19.59	16.86	16.24	100.00
Percentage of Total Variance	27.39	11.34	9.76	9.40	57.88

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